PB89-225486

Superfund Record of Decision (EPA Region 5): Forest Waste Disposal, MI. (Second Remedial Action), March 1988

(U.S.) Environmental Protection Agency, Washington, DC

31 Mar 88

U.S. Department of Commerce
National Technical Information Service
NTIS

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R05-88/062	2.	3. Recipient's Accession No. PB89 225486/AS

4. Title and Subtitle
SUPERFUND RECORD OF DECISION
Forest Waste Disposal, MI
Second Remedial Action

5. Report Date
3/31/88

6.

7. Author(s)

8. Performing Organization Rept. No.

9. Performing Orgainization Name and Address

10. Project/Task/Work Unit No.

11. Contract(C) or Grant(G) No.
(C)
(G)

12. Sponsoring Organization Name and Address
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

13. Type of Report & Period Covered
800/000

14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Forest Waste Disposal site consists of an 11-acre, abandoned municipal and industrial waste landfill and 9 surface impoundments. It is located in Genesee County, Michigan, 20 miles northeast of Flint, and is surrounded by agricultural land and undeveloped woodlands and wetlands. An estimated 20 to 30 households are located within a quarter mile of the site. Wetlands in the site vicinity drain into Butternut Creek which eventually discharges into the Flint River. The site is underlain by two drinking water aquifers. Forest Waste Disposal conducted landfill operations from 1972-1978, receiving limited types of liquid industrial waste, general household refuse, and drummed waste until 1978. Specific waste material found within the landfill includes PBB-contaminated feed, septic sludge, and drums containing primarily solid and liquid VOCs in high concentrations. The operator also was suspected of discharging liquid wastes into the landfill and onto the ground. In 1982, the site was placed on the NPL. This remedial action addresses the landfill and contaminated ground water on the east end of the site. Contamination from the nine waste lagoons is considered to be the primary source affecting ground water and is addressed (See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision - Forest Waste Disposal, MI
Second Remedial Action
Contaminated Media: gw, soil
Key Contaminants: VOCs (Toluene, TCE), Organics, (Pesticides, PAHs, PBBs), Metals (arsenic, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 141
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77)
(Formerly NTIS-35)
Department of Commerce

United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R05-88/062
March 1988

PB89-225486

EPA

Superfund Record of Decision:

Forest Waste Disposal, MI

REPRODUCED BY
U.S. DEPARTMENT OF COMMERCE
NATIONAL TECHNICAL INFORMATION SERVICE
SPRINGFIELD, VA. 22161

EPA/ROD/R05-88/062
Forest Waste Disposal, MI
Second Remedial Action

16. ABSTRACT (continued)

in a previous remedial action, which includes: offsite treatment and disposal of lagoon liquid, with onsite treatment and offsite disposal of lagoon sediment, sludge and soil. The primary contaminants of concern affecting the soil and ground water are VOCs including toluene and TCE; other organics including pesticides, PAHs and PBBs; and metals including arsenic and lead.

The selected remedial action for this site includes: removal and either onsite or offsite incineration of approximately 4,000 drums and 1,000 yd3 of associated contaminated soil; installation of a containment system including a RCRA cap, slurry wall, dewatering system and a leachate collection system; and treatment and disposal of collected leachate. The ground water remedy includes: deed restrictions to prevent use of the ground water as a drinking water source; access restrictions; and ground water monitoring. The estimated present worth cost for this remedial action is $23,820,000 with an annual O&M of $440,500.

PERFORMANCE STANDARDS OR GOALS: The remediation of the landfill will prevent migration of contaminants to a drinking water aquifer in excess of MCLs, lifetime health advisories, and noncarcinogenic reference doses, and will result in an excess lifetime cancer risk range of 10-4 to 10-7. The remedial action also will prevent migration to surface water bodies in excess of Federal and State water quality criteria. Cleanup goals for individual chemicals were not specified.

INSTITUTIONAL CONTROLS: Deed restrictions will be implemented to prevent use of the ground water onsite and from areas adjacent to the site as a drinking water source.

KEYWORDS: Air Monitoring; Alternate Closure; Arsenic; Capping; Carcinogenic Compounds; Containment; Deed Restriction; Direct Contact; Ground Water; Ground Water Monitoring; Inorganics; Leachate Collection/Treatment; Lead; MCLs; Metals; O&M; Onsite Treatment; Organics; PAHs; Pesticides; RCRA; RCRA Landfill Specifications; State Criteria; Soil; Solvents; Slurry Wall; TCE; Toluene, VOCs; Water Quality Criteria; Wetlands; Woodlands.

Declaration for the Record of Decision

Forest Waste Disposal
Otisville, Michigan

PURPOSE

This decision document represents the final selected remedial action for the Forest Waste Disposal site in Otisville, Michigan. It was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (40 CFR Part 300).

The State of Michigan has been consulted on the selected remedy and opposes the remedy.

BASIS

The selection of remedy is based upon the Forest Waste Disposal Site Administrative Record. The attached index identifies the items which comprise this record.

DESCRIPTION OF SELECTED REMEDY

The final remedial action addresses two site operable units: the landfill soil and source materials, and contaminated groundwater on the east end of the site.

The landfill operable unit remedial action consists of the following:

Removal and offsite treatment of areas of concentrated drums and associated saturated contaminated soils;

Installation of a Resource Conservation and Recovery Act (RCRA) cap over the landfill;

Installation of a soil-bentonite slurry wall vertical barrier with a dewatering system surrounding the landfill;

Collection and treatment of the groundwater from the dewatering system;

Access restrictions on the Forest Waste property and areas immediately surrounding the site;

Installation of fence around the landfill area; and

Groundwater monitoring around the landfill.

The groundwater operable unit remedial action consists of the following:

Access restrictions which include prevention of drinking water wells in the shallow aquifer on the site or in adjacent areas; and

Groundwater monitoring to assess the changes in location and concentration of the contaminant plume.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate, and is cost-effective. As mandated by CERCLA and as amended by SARA, the remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume of hazardous substances as a principal element. Finally, this remedy utilizes permanent solutions to the maximum extent practicable.

Because this remedy will result in hazardous substances remaining onsite above health-based levels, a review will be conducted every 5 years after commencement of remedial action to ensure that the remedy continues to provide adequate protection of human health and the environment.

March 31st, 1988
Date

Valdas V. Adamkus
Valdas V. Adamkus
Regional Administrator
U.S. EPA, Region V

Summary of Remedial Alternative Selection
Forest Waste Disposal
Otisville, Michigan

SITE LOCATION AND DESCRIPTION

The Forest Waste site is in the rural southeast corner of Section 8, Forest Township (T9N, R8E), Genesee County, Michigan. It is 20 miles northeast of Flint, and 2 miles northwest of the City of Otisville (Figure 1). In 1982, the population within a 3-mile radius of the site was estimated at 3,120 by the Michigan Department of Natural Resources (MDNR). Otisville had an estimated population of 720. An estimated 20-30 households are within a quarter mile of the site.

The site is generally flat except for slight irregularities in the land surface suggesting waste disposal. Vegetation consists of grass and weeds, low shrubs, and a few scattered trees. Land surrounding the site is approximately 50 percent agricultural and 50 percent undeveloped (woodlands and wetlands). Butternut Creek flows past the southeast corner of the site, continuing southwest and discharging into the Flint River.

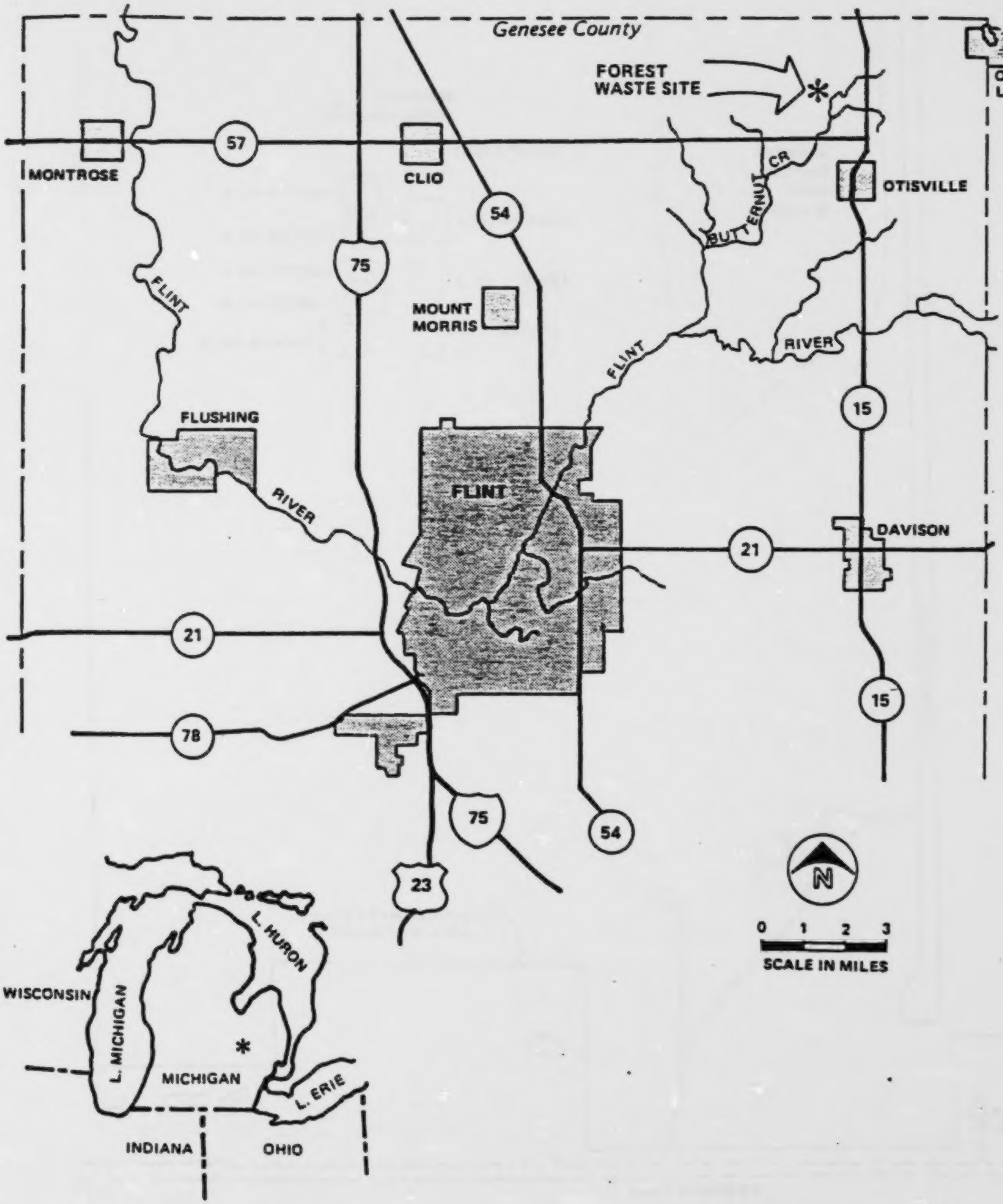
Physical features of the site include a landfill and nine surface impoundments, or lagoons, that were used for waste disposal. The landfill area occupies approximately 11 acres of the 112-acre property. It is covered with vegetation and native soil, although refuse and rusty drums are exposed in some places. The nine lagoons have a collective surface area of about 1 acre. A schematic site map is presented in Figure 2.

The regional geography of Forest Township is typical of glaciated areas, characterized by morainal deposits. The topography of Forest Township is hilly in the east, grading to a slightly undulating and, in places, flat surface in the west.

The surficial geology in the vicinity of the Forest Waste site is primarily derived from Wisconsin Age glacial deposits, and generally consists of layers of medium sand with fine gravel, alternating with layers of silty clay morainal till deposits.

Bedrock in the site vicinity is reported to be the Pennsylvanian Age Saginaw formation. Generally, the Saginaw formation is a series of irregular aquifers. Bedrock described in residential well drilling logs is predominantly sandstone, with interbedded layers of shale and limestone ranging from 1 to 39 feet thick. Generally, these interbedded layers of shale and limestone are less than 20 feet thick, averaging about 9 feet in thickness.

1.a



Genesee County
FOREST WASTE SITE
OTTER LAKE
MONTROSE
57
CLIO
OTISVILLE
BUTTERNUT CR
54
75
MOUNT MORRIS
FLINT
RIVER
15
FLUSHING
FLINT
RIVER
DAVISON
21
21
15
78
75
54
23
N
0 1 2 3
SCALE IN MILES
L. HURON
WISCONSIN
L. MICHIGAN
MICHIGAN
L. ERIE
INDIANA
OHIO

FIGURE 1
LOCATION MAP
FOREST WASTE DISPOSAL SITE
FOREST WASTE RI

1.6

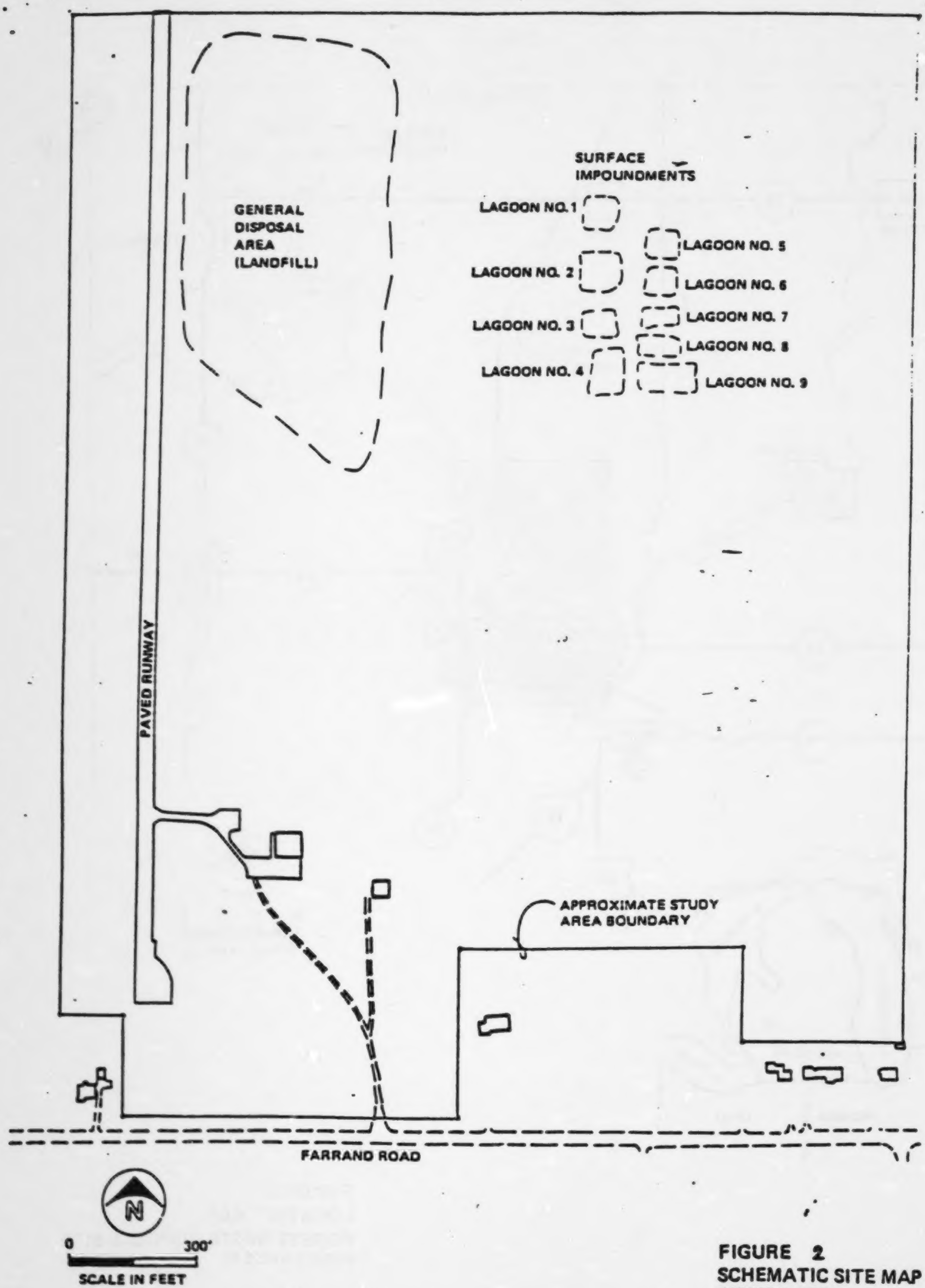

SURFACE IMPOUNDMENTS
GENERAL DISPOSAL AREA (LANDFILL)
LAGOON NO. 1
LAGOON NO. 5
LAGOON NO. 2
LAGOON NO. 6
LAGOON NO. 3
LAGOON NO. 7
LAGOON NO. 8
LAGOON NO. 4
LAGOON NO. 9
PAVED RUNWAY
APPROXIMATE STUDY AREA BOUNDARY
FARRAND ROAD
N
0
300'
SCALE IN FEET

FIGURE 2
SCHEMATIC SITE MAP
FOREST WASTE RI

Three hydrogeologic units, occurring at different elevations beneath the site, have been identified in the saturated glacial deposits. These are:

- Shallow Aquifer: An unconfined aquifer consisting of approximately 20 feet of fine to medium sands, and located approximately 10 to 30 feet below ground surface.
- Till Aquiclude: A low permeable confining unit, consisting of 10 to 30 feet of glacial till, and located approximately 20 to 35 feet below ground surface.
- Deep Aquifer: An aquifer consisting of 7 to 27 feet of medium-coarse gravel, and located approximately 40 to 60 feet below ground surface.

The shallow aquifer unit, in general, is a very fine to medium-grained sand containing some silt, with only the lower half of the sand layer being saturated.

The shallow groundwater flows toward the east at the northern portion of the site and toward the southeast at the southern portion of the site as shown in Figure 3. In general, this flow is directed toward and discharges to the marshy region and Butternut Creek.

Horizontal hydraulic gradients are relatively flat in the western half of the site, with values of 0.0007 ft/ft in the north (in the vicinity of the landfill) increasing to 0.005 ft/ft in the south. The gradients vary between 0.004 and 0.007 ft/ft over the eastern half of the site.

The estimated hydraulic conductivities for the shallow aquifer are between 5×10^{-4} cm/sec and 1×10^{-3} cm/sec. These fall within the expected range of hydraulic conductivities of silty sands to clean sands.

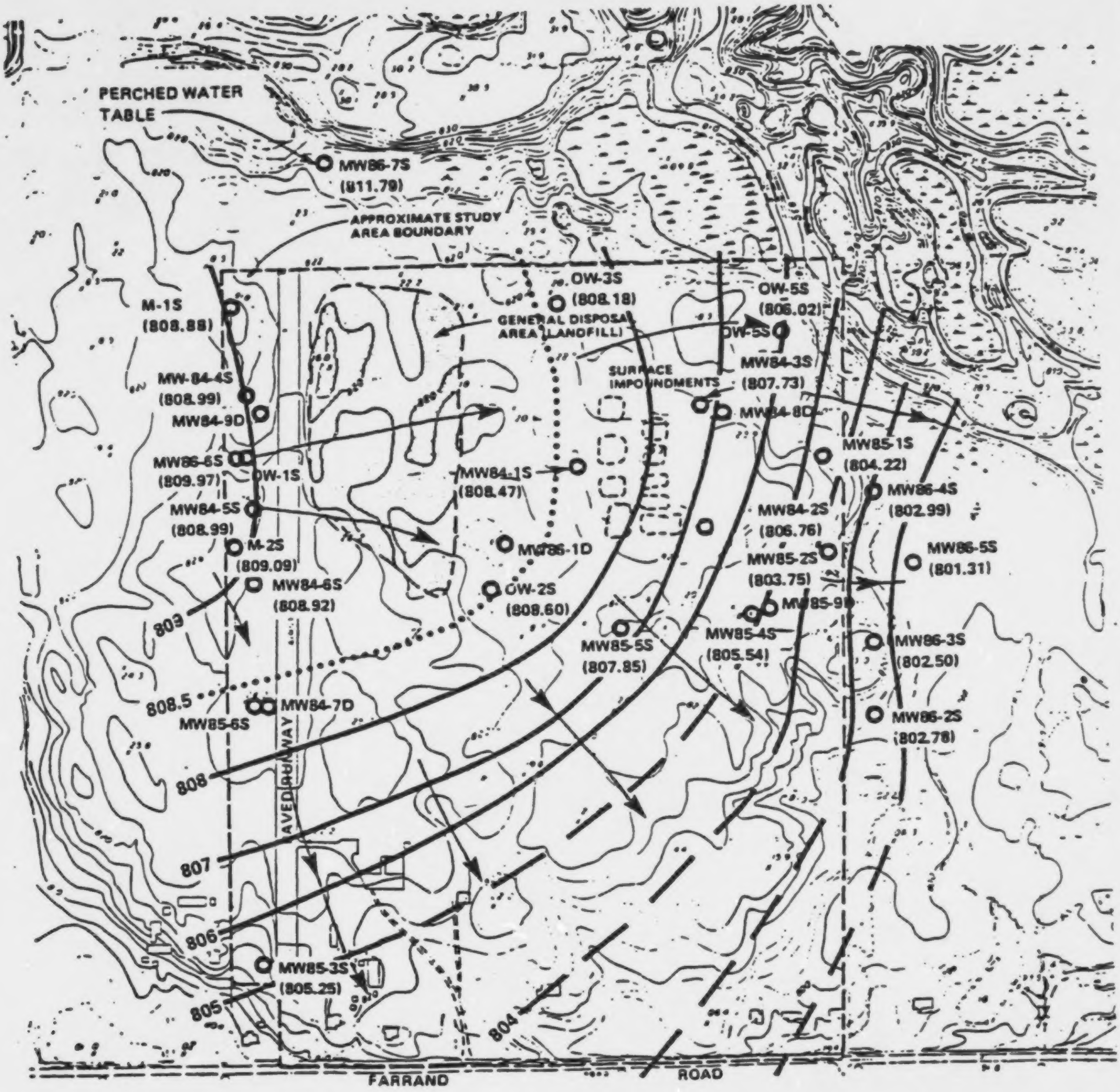
Average linear groundwater velocities for the western half of the site range from about 2 ft/yr in the north (in the vicinity of the landfill) to about 17 ft/yr in the south. Velocities for the eastern half of the site vary from about 13-24 ft/yr. These velocities are based on an average hydraulic conductivity of 1×10^{-3} cm/sec and an assumed effective porosity of 0.30.

The effect of the landfill on groundwater elevation, direction, and velocity can be estimated, but cannot be fully assessed because of the lack of information on the groundwater beneath the landfill. Water levels measured in monitoring wells adjacent to the landfill indicate that a groundwater mound may be present, but does not extend beyond the estimated landfill disposal area boundaries.

The shallow aquifer appears to be continuously underlain by a silt or clay till of low hydraulic conductivity whose thickness ranges from 15 to 27 feet. Most of the low hydraulic conductivity materials in this confining

Reproduced from best available copy.

2.a


PERCHED WATER TABLE
MW86-7S (811.79)
APPROXIMATE STUDY AREA BOUNDARY
M-1S (808.88)
OW-3S (808.18)
OW-5S (806.02)
GENERAL DISPOSAL AREA (LANDFILL)
OW-5S
MW84-3S (807.73)
SURFACE IMPOUNDMENTS
MW84-8D
MW-84-4S (808.99)
MW84-9D
MW86-6S (809.97)
OW-1S
MW84-1S (808.47)
MW85-1S (804.22)
MW86-4S (802.99)
MW84-5S (808.99)
M-2S (809.09)
MW86-1D
MW84-2S (806.76)
MW85-2S (803.75)
MW86-5S (801.31)
MW84-6S (808.92)
OW-2S (808.60)
MW85-9D
809
MW85-5S (807.85)
MW85-4S (805.54)
MW86-3S (802.50)
808.5
MW85-6S
MW84-7D
MW86-2S (802.78)
PAVED RUNWAY
808
807
806
MW85-3S (805.25)
805
804
FARRAND
ROAD

LEGEND

○ M-1, M-2, OW-1, OW-2, OW-3, OW-5 PRE-PHASE I MONITORING WELLS

○ MW84 PHASE I MONITORING WELLS

○ MW85 PHASE II MONITORING WELLS

○ MW86 PHASE III MONITORING WELLS

809 ELEVATION OF CONTOUR LINE

808.25 MEASURED GROUNDWATER ELEVATION (FT)

•••••••••• 1/2 FT CONTOUR (ONLY AT 808.5)

— — INFERRED CONTOUR LINE

—— GROUNDWATER ELEVATION CONTOUR LINE

←— DIRECTION OF POTENTIAL GROUNDWATER FLOW

Note: Contour Interval = 1 ft.

N

0 250' 500'

SCALE IN FEET

FIGURE 3
GROUNDWATER ELEVATIONS IN THE SHALLOW AQUIFER
MAY 12, 1986
FOREST WASTE RI

layer are clay tills, but a predominantly silt till is present in the upper 9 feet near the northwest corner of the site.

The hydraulic conductivity values for the till, calculated from falling head permeability test, range from 1 x 10^{-7} to 5 x 10^{-8} cm/sec. Based on a hydraulic conductivity of 1 x 10^{-7} cm/sec, an assumed effective porosity of 0.30, and a vertical hydraulic gradient range of 0.4 to 0.8 ft/ft, the average downward groundwater velocities range from 0.14 to 0.28 ft/yr.

The deep aquifer varies from 7 to 27 feet in thickness. The composition varies from a slightly silty, fine to coarse sand to a relatively clean sand and gravel. In general, the deep aquifer groundwater flows toward the southeast in the western portion of the site and toward the southwest in the eastern portions of the site as shown in Figure 4. Horizontal hydraulic gradients for both flow paths are similar, ranging from 0.001 to 0.003 ft/ft.

Water levels in the deep aquifer are consistently 11 to 15 feet lower than those in the shallow aquifer. Downward vertical gradients between the two aquifers range from 0.4 to 0.8 ft/ft. The differences in both the water levels and the flow directions of the upper and lower aquifers indicate that the hydraulic connection between aquifers is limited.

In situ hydraulic conductivity testing determined that hydraulic conductivities of the deeper aquifer range from 1 x 10^{-3} cm/sec to 7 x 10^{-5} cm/sec. Based on a hydraulic conductivity of 1.3 x 10^{-3} cm/sec, an assumed effective porosity of 0.30, and a horizontal hydraulic gradient of 0.001 to 0.003 ft/ft, the groundwater velocities range from 4 ft/yr to 13 ft/yr.

The Forest Waste Disposal site lies just west of a marshy area. Surface water bodies include a small lake 1/2-mile north of the site and a small residential pond southeast of the site. Surface drainage across the site is southeast to Butternut Creek. The marshy area west of the site also drains into Butternut Creek, which flows past the southeast corner of the site (approximately 1,000 feet from the eastern site boundary). Butternut Creek flows southwest for 8 miles before discharging into the Flint River.

Residential wells in the vicinity of the site draw water predominantly from the bedrock sandstone aquifer. The location of residential wells in close proximity to the site and where known, the approximate well screen depth, are shown in Figure 5.

SITE HISTORY

Previous Activities

Forest Waste Disposal is now closed. It was first operated as a sanitary landfill in 1972. An Order of Determination was issued by the Michigan Department of Natural Resources (MDNR) Water Resources Commission on December 21, 1972, to property owners Walter and Elaine Rix to receive limited types of liquid industrial waste in accordance with Michigan Act

245, Public Act 1929, as amended. Subsequently, under Michigan Act 87, P.A. 1965, licenses were issued to the property owners to receive general refuse, and industrial and liquid waste from December 10, 1973 to September 1, 1978. During this time, the landfill was also granted permission to accept, on occasion, hazardous waste [i.e., polybrominated biphenyls (PBB), polychlorinated biphenyls (PCB)] under MDNR and Genesee County Health Department (GCHD) supervision. The exact date on which the Forest Waste Disposal site began accepting waste is not known, but it is thought to be no sooner than when the licenses were issued. In 1974, the facility accepted sludge and residual waste from the Agrico Chemical Warehouse of Bridgeport, Michigan. Likewise, PCB and PBB were disposed of at the site in 1975.

In 1975, Mr. Rix died and ownership of the landfill was assumed by Mrs. Rix, who currently resides in Florida. The site license was reviewed for renewal in 1978; the GCHD did not grant renewal due to operational and various other violations. As a result, Mrs. Rix was ordered to properly phase out the site according to the guidelines established under the Michigan Solid Waste Management Act.

During operations of the site, incoming wastes to the landfill were not screened by the facility owner. Drummed wastes from various sources, including wastes transported to the site by Berlin and Farro Incineration, were disposed of in the landfill area. The waste fill is covered, although refuse and rusty drums are exposed in some places.

MDNR files indicate the lagoons originally accepted metallic sludges, which were to be pretreated before receipt onsite, and acidic and basic liquids, which were to be neutralized before shipment to the site.

Among the types of wastes which have been documented as being accepted at the site, those suspected of being disposed of in the onsite lagoons include the following: waste oils, septic tank waste, plating wastes, phosphate zinc wastes, metal sludges, spent sulfuric acid, and paint wastes. MDNR file information indicates that incoming wastes were not screened by the facility owner and that the operator often mixed different waste streams in some of the lagoons. The operator was also suspected of discharging liquid wastes into the landfill area and onto the ground.

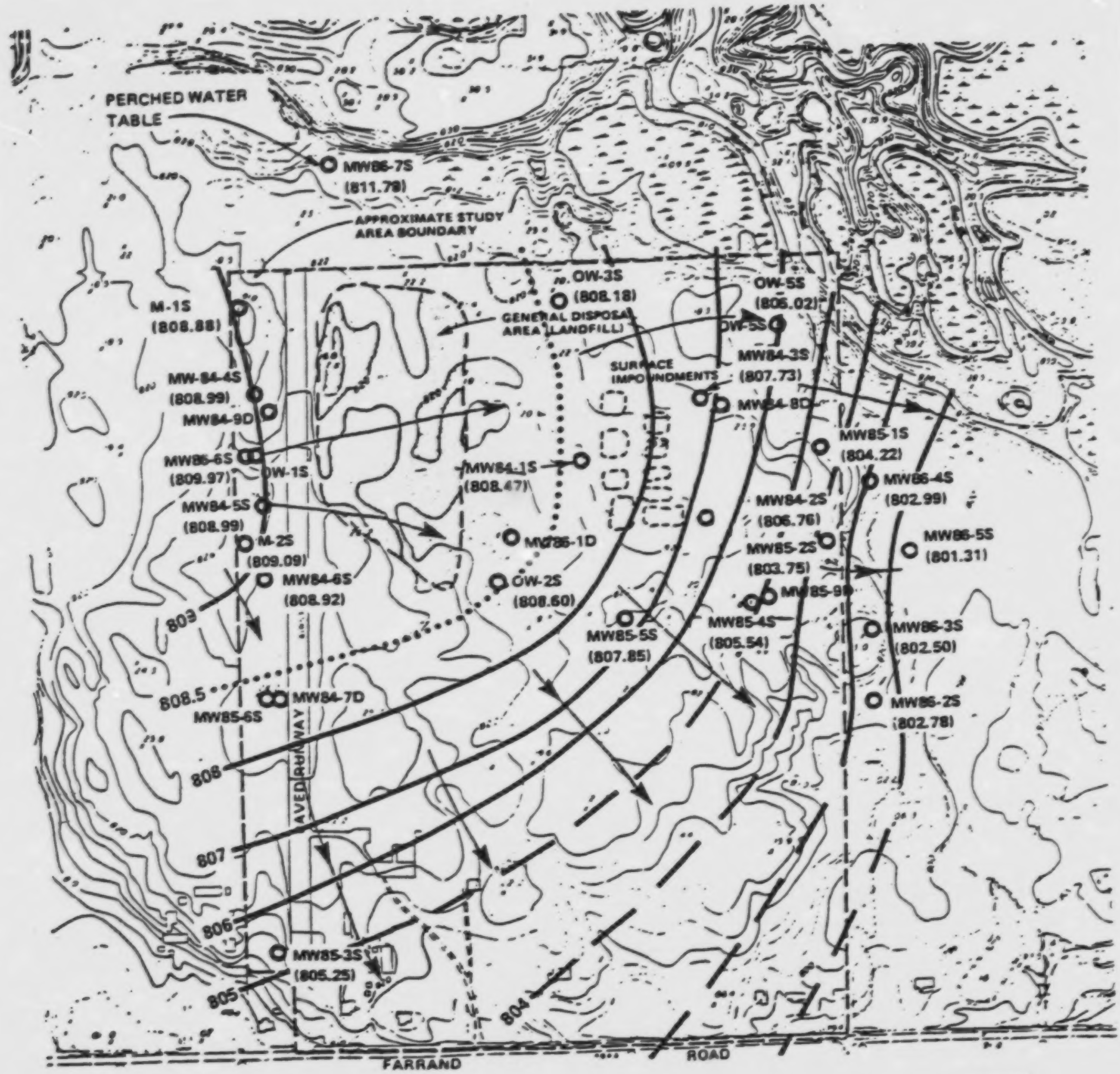
In December 1982, the site was placed on U.S. EPA's National Priorities List (NPL) of abandoned or uncontrolled hazardous waste sites eligible for investigation and cleanup under the Superfund Program.

In January 1984, a Remedial Action Master Plan (RAMP) for the Forest Waste Disposal Site was completed by U.S. EPA contractors. The RAMP is a plan for undertaking Remedial Investigation (RI) activities and identifying appropriate initial remedial actions at a site.

In 1984, the U.S. EPA constructed a fence around the site and posted warning signs. The fence was installed to serve as a deterrent to trespassers and thus help prevent humans from coming into direct contact with hazardous substances at the site.

4.a

Reproduced from
best available copy.


PERCHED WATER TABLE
MW86-7S (811.79)
APPROXIMATE STUDY AREA BOUNDARY
M-1S (808.88)
MW-84-4S (808.99)
MW84-9D
MW86-6S
OW-1S
(809.97)
MW84-5S (808.99)
M-2S (809.09)
MW84-6S (808.92)
OW-3S (808.18)
GENERAL DISPOSAL AREA (LANDFILL)
OW-5S (806.02)
OW-5S
SURFACE IMPOUNDMENTS
MW84-3S (807.73)
MW84-8D
MW84-1S (808.47)
MW86-1D
OW-2S (808.60)
MW85-1S (804.22)
MW86-4S (802.99)
MW84-2S (806.76)
MW85-2S (803.75)
MW86-5S (801.31)
MW85-9D
MW85-4S (805.54)
MW85-5S (807.85)
MW86-3S (802.50)
MW86-2S (802.78)
MW84-7D
MW85-6S
PAVED RUNWAY
MW85-3S (805.25)
809
808.5
808
807
806
805
804
FARRAND ROAD

LEGEND

- ○ M-1, M-2, OW-1, OW-2, OW-3, OW-5 PRE-PHASE I MONITORING WELLS
- ○ MW84 PHASE I MONITORING WELLS
- ○ MW85 PHASE II MONITORING WELLS
- ○ MW86 PHASE III MONITORING WELLS

809	ELEVATION OF CONTOUR LINE
808.25	MEASURED GROUNDWATER ELEVATION (FT)
•••••••••••	1/2 FT CONTOUR (ONLY AT 808.5)
— —	INFERRED CONTOUR LINE
——	GROUNDWATER ELEVATION CONTOUR LINE
←	DIRECTION OF POTENTIAL GROUNDWATER FLOW

Note: Contour Interval = 1 ft.

N

0 250' 500'
SCALE IN FEET

FIGURE 4
GROUNDWATER ELEVATIONS IN THE SHALLOW AQUIFER
MAY 12, 1986
FOREST WASTE RI

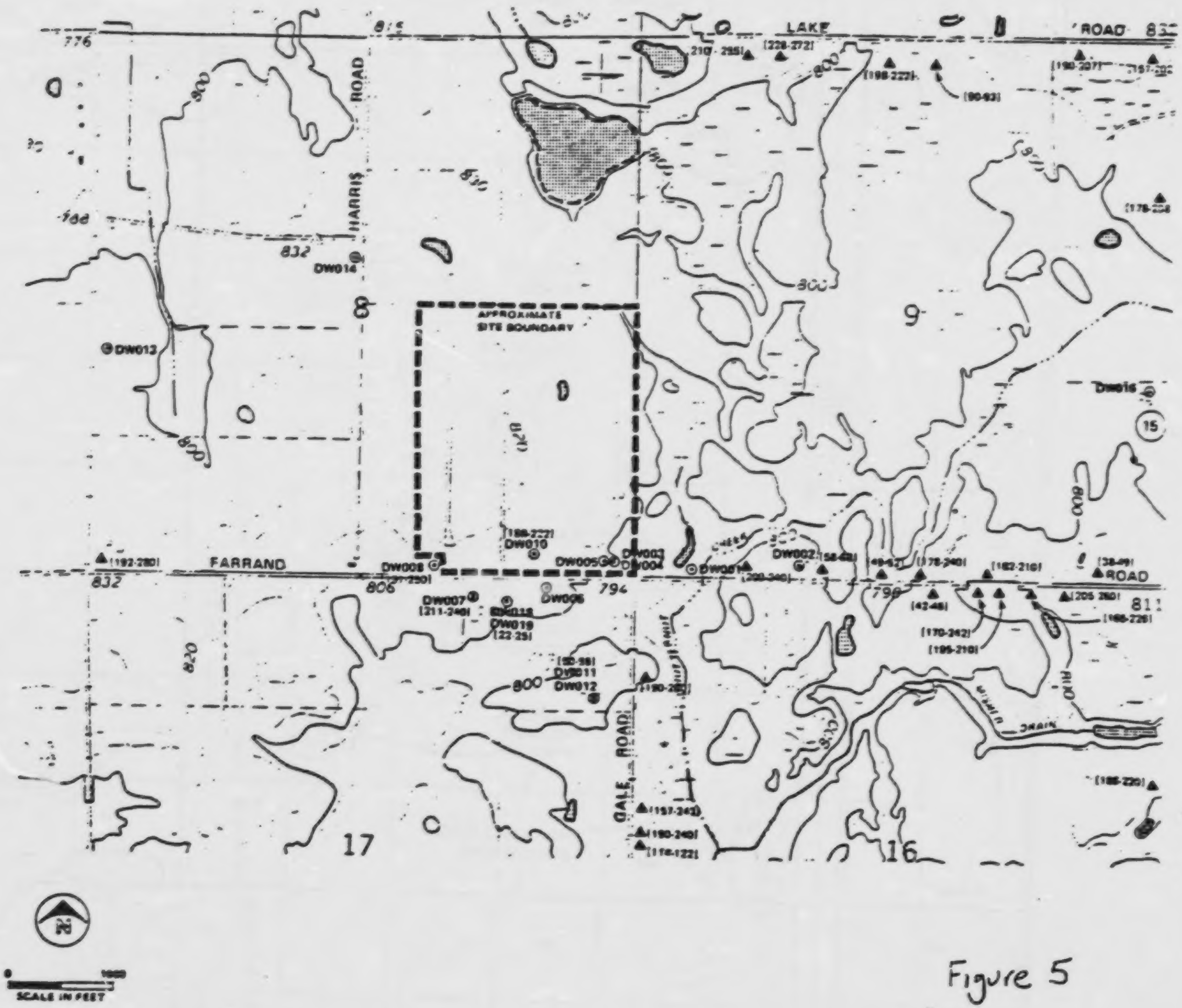
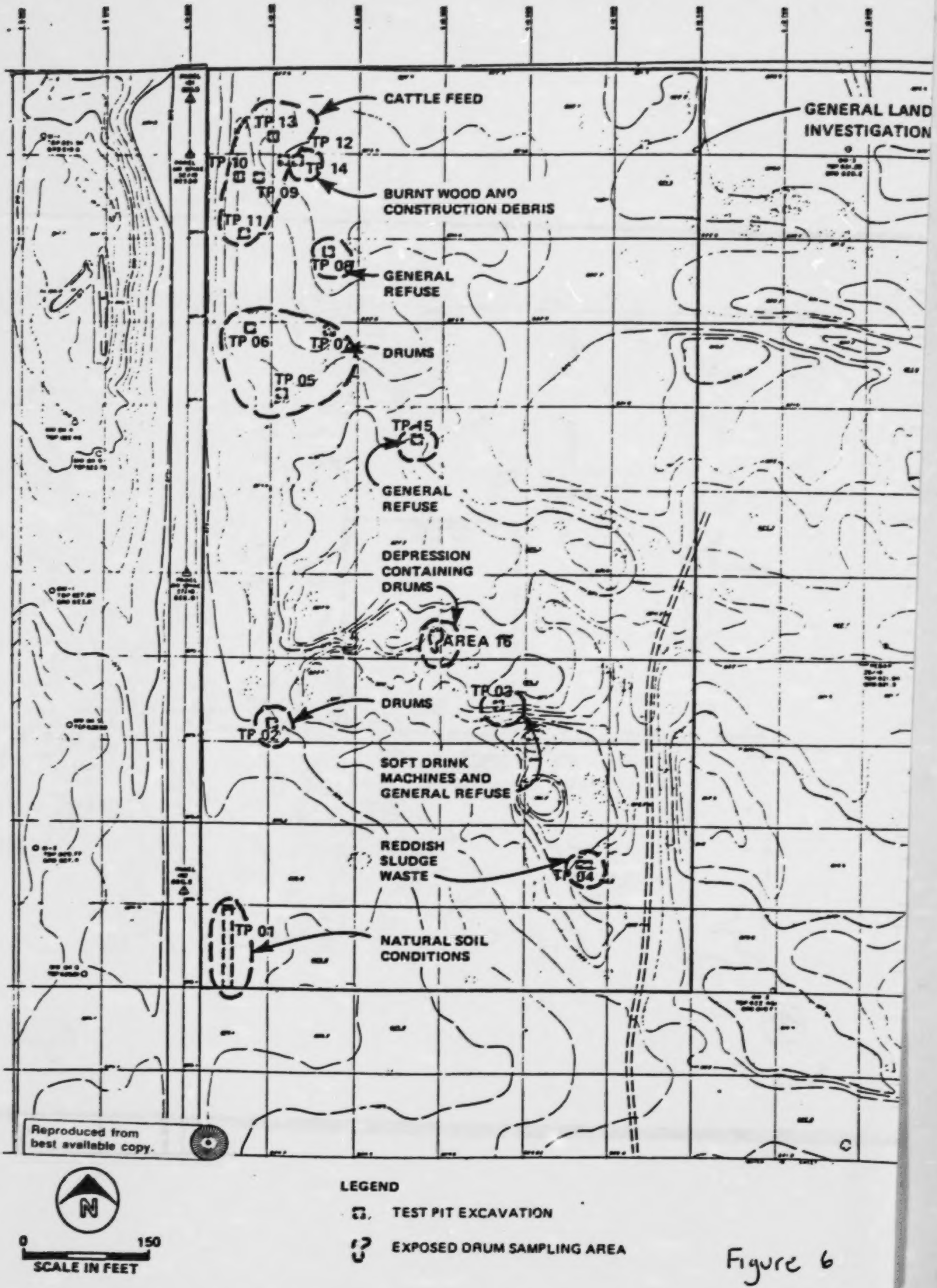

LAKE
ROAD
776
815
832
HARRIS
ROAD
800
830
832
DW014
DW013
APPROXIMATE
SITE BOUNDARY
[210-295]
[228-272]
[198-222]
[90-93]
[190-207]
[197-202]
[178-226]
9
DW016
15
FARRAND
ROAD
[192-280]
806
794
796
811
[198-222]
DW010
DW008
[27-250]
DW005
DW003
DW004
DW001
[200-240]
DW002
[58-68]
[49-62]
[178-240]
[182-210]
[38-49]
[42-48]
[205-280]
[170-242]
[195-210]
[168-226]
DW007
[211-240]
DW018
DW019
[22-25]
DW006
820
800
[50-98]
DW011
DW012
[190-280]
GALE
ROAD
DRAIN
[157-242]
[190-240]
[116-122]
[186-220]
17
16
N
SCALE IN FEET
0
1000

Figure 5

4·C


CATTLE FEED
GENERAL LAND INVESTIGATION
TP 13
TP 12
TP 14
TP 10
TP 09
TP 11
BURNT WOOD AND CONSTRUCTION DEBRIS
TP 08
GENERAL REFUSE
TP 06
TP 07
TP 05
DRUMS
TP 15
GENERAL REFUSE
DEPRESSION CONTAINING DRUMS
AREA 16
TP 03
DRUMS
TP 02
SOFT DRINK MACHINES AND GENERAL REFUSE
REDDISH SLUDGE WASTE
TP 04
TP 01
NATURAL SOIL CONDITIONS
N
0
150
SCALE IN FEET
LEGEND
TEST PIT EXCAVATION
EXPOSED DRUM SAMPLING AREA

Reproduced from best available copy.

Figure 6

In June 1986, U.S. EPA selected a cleanup alternative for the site lagoon source materials. The lagoon cleanup action is in Remedial Design phase. The selected lagoon remedial alternative is removal and offsite treatment and disposal of lagoon liquids; and removal, onsite treatment, and offsite disposal of contaminated lagoon sediment, sludge, and soil. Construction for lagoon cleanup is scheduled for Summer 1988.

In 1987, ownership of the FWD site was assumed by MDNR because of tax payment delinquency by the previous site owner.

Current Site Status

In December 1983, a Remedial Investigation (RI) was initiated to define the nature and extent of contamination at the site and characterize the potential threats to public health and the environment from the site. RI field activities were performed in three phases and were completed in April 1987. The RI included geophysical and hydrogeologic investigations to define the site hydrology and hydrogeology and to better identify areas of suspected drum burial in the landfill. Environmental sampling was also performed to determine the type, extent, and magnitude of contamination at the site.

The results of the RI are described in the RI report, dated August 28, 1987. This report also summarizes site data collected previous to the RI, by the Genesee County Health Department (GCHD), MDNR, and U.S. EPA.

The site Feasibility Study (FS) was completed January 20, 1988. The FS documents in detail the development and evaluation of an array of remedial action alternatives for the FWD site.

Site Characterization

The following discussion briefly summarizes the nature and extent of contamination according to the respective media sampled during RI investigations.

1. Landfill Contents

In general, five classifications of contaminant sources were encountered during the landfill investigation: bulk wastes, drummed liquids and solids, PBB-contaminated cattle feed, agricultural chemical warehouse fire debris, and contaminated soil. It should be emphasized that the landfill is incompletely characterized. Fifteen test pits were excavated over the 11-acre landfill area. The intent of the investigation was not to fully establish the nature and extent of contamination, but to verify some of the manifest and disposal file information for the site.

Buried drums were discovered at several test pit locations (Figure 6). The drums contained primarily noncorrosive volatile organic compounds (solid and liquid) in high concentrations.

Test pit soils surrounding the drums were also found to be contaminated with the same constituents present in the drums, but at somewhat lower concentrations. This suggests that either past disposal practices included the dumping of noncontainerized liquids and sludges, or drum leakage has occurred. One perched water sample taken from a test pit excavation also contained similar volatile contaminants as discovered in the drummed solids and liquids and test pit soils.

Cattle feed contaminated with PBB was found where indicated by MDNR file information.

2. Groundwater

Two general areas of the shallow aquifer appear contaminated, southeast and east of the landfill and southeast and east of the lagoons. The area southeast and east of the landfill is characterized by relatively high specific conductance values. This is likely due to past brine disposal in that area of the site. In addition, the shallow aquifer east of the lagoons contains areas of relatively high pH (greater than 9) and several organic compounds (trans-1,2-dichloroethene, 1,1,1-trichloroethane, toluene, 1,1-dichloroethane, and trichloroethene). The deep aquifer contained several inorganic constituents at elevated levels above background; however, no patterns or plumes were identified. Sporadic low concentrations of organics were detected in the deep aquifer; however, the types and distribution of constituents did not reveal any patterns of contamination.

Table 1 lists the 18 organic constituents detected in groundwater samples from both the shallow and deep aquifers at the site.

It is not apparent that the site contaminants found in the landfill and the lagoons can account for the detection of organics in the deep aquifer. Furthermore, the inconsistency in detection of contaminants in the two aquifers suggests that contamination of the shallow aquifer has not affected the deep aquifer. This is also supported by the hydrogeologic characteristics (flow direction and horizontal gradients) of the two aquifers and the confining unit between them. However, interaction between the two aquifers is not impossible.

The nature of the release to the shallow groundwater suggests the site lagoons are the source of this contamination. Several volatile compounds found in the lagoons were also found in the shallow groundwater to the east and southeast. The extent of this release is limited to onsite areas. RI data from monitoring wells surroundihg the landfill have indicated that waste releases from the landfill have not affected groundwater downgradient from the landfill.

Residential drinking water wells were sampled during the site RI. No hazardous substance list organic compounds were detected in

Constituent	Monitoring Wells West Of The Landfill												Monitoring Wells West Of The Lagoons					Monitoring Wells East Of The Lagoons											
	M-1S	M-2S	OW-1S	84-4S	84-5S	84-6S	85-3S	85-6S	86-6S	86-7S	84-7D	84-9D	OW-2S	OW-3S	84-1S	85-5S	86-1D	OW-5S	84-2S	84-3S	85-1S	85-2S	85-4S	86-2S	86-3S	86-4S	86-5S	84-8D	85-9D
Benzene																			X										
1, 1, 1-Trichloroethane																					X								
1, 1-Dichloroethane														X					X		X								
Trans-Dichloroethene																			X		X								
Methylene Chloride						X								X	X				X										
Tetrachloroethene																				X									
Toluene																			X										
Trichloroethene																			X		X								
Acetone																			X										
2-Butanone																			X		X	X	X						
2-Hexanone																			X										
Benzoic Acid																			X										
Phenol																	X												
2-Methylphenol																			X										
4-Methylphenol																			X										
1, 2-Diphenylhydrazine											X																		
Bis (2-Ethylhexyl) Phthalate				X	X	X					X																		X
Di-n-Octylphthalate																												X	

Note: Table entries represent organic constituents detected in a sample from any one of three phases of sampling. Shaded areas represent deep monitoring wells.

Source: Forest Waste Site Remedial Investigation Report, August 1987.

TABLE 1
ORGANIC CONSTITUENTS DETECTED IN THE GROUNDWATER AT THE FOREST WASTE SITE

6.a

the residential well water. Inorganic concentrations detected do not suggest that the wells have been affected by the site.

3. Surface Soils

Inorganic constituents of primary concern in the landfill surface soil included barium, lead, and nickel. Organic compounds, such as polycyclic aromatic hydrocarbons (PAHs) and pesticides (DDT, DDE endosulfan, and dieldrin), were present throughout the landfill area. PBBs were present in the northern surface portion of the landfill, coinciding with the reported disposal area of contaminated cattle feed. The peripheral areas of the landfill contained elevated levels of arsenic (above background) and chlordane.

4. Lagoon Liquids, Soil, Sediment, and Sludges

The constituents found in the lagoons are described in detail in the Forest Waste RI report (August 28, 1987). The remedial alternative for the lagoons has already been selected and design is underway. Therefore, further discussion of the findings for this document is not necessary.

5. Offsite Surface Water and Sediments

The type and distribution of compounds detected in the offsite surface water and sediments did not reveal any pattern of contamination. One surface water location has a number of inorganic constituents that exceeded Federal Ambient Water Quality Criteria. It is likely that the higher concentrations of inorganics merely reflected the poorer quality of water in the wetland area and the possible entrainment of suspended solids in the shallow sample.

RISK ASSESSMENT SUMMARY

A baseline risk assessment was performed as part of the FWD RI (Chapter 6) to evaluate potential site hazards to public health and the environment assuming no remedial action is taken at the site. The risk assessment included the following:

- Identification of potential chemicals of concern
- Toxicity Assessment
- Exposure Assessment
- Risk Characterization

The potential chemicals of concern were identified in a conservative fashion at this site. Distribution of site contaminants identified in the RI was somewhat sporadic, indicating areas of discrete contamination as opposed to area-wide contamination. Therefore, any chemical detected at the site having a critical toxicity value (i.e., cancer potency factor or reference dose) was identified as a potential chemical of concern. Six additional chemicals, without critical toxicity values, were identified as potential chemicals of concern, based on critical toxicity values of similar chemicals. Polybrominated biphenyl (PBB) was also identified as a potential chemical of concern because of its persistence and identification as a potential carcinogen by the National Toxicology Program. Table 2 lists the FWD site potential contaminants of concern.

Potential chemicals of concern were then described in terms of their toxicological properties in a toxicity assessment.

In the exposure assessment, potential pathways by which humans and wildlife populations could be exposed were identified. A pathway is considered complete if all the following elements are present: A contaminant source, a mechanism for chemical release, an environmental transport medium and exposure point, and a feasible route of exposure. Exposure pathways are considered for current and future land use conditions.

The exposure pathways of greatest interest under current land use conditions are:

- Exposure of trespassers by direct contact with exposed wastes and contaminated soil onsite
- Exposure of terrestrial wildlife by direct contact with exposed wastes and contaminated soil onsite and by contaminant uptake through the food chain
- Exposure of wildlife populations that come into contact with surface water/sediment contaminated by discharges (runoff and groundwater) from the site
- Exposure of downgradient groundwater users from ingestion of contaminated groundwater

Under a future land use for the site the exposure pathways of interest include:

- Exposures from residential development associated with direct contact with soil and groundwater use
- Exposures from commercial development associated with direct contact with soil and from groundwater use

A Risk Characterization was performed in which public health and environmental risks to potentially exposed populations were presented. The public health evaluation was performed for each exposure media and included: 1) a comparison of estimated intakes (of contaminated media) to acceptable intakes for noncarcinogenic chemicals; and 2) an estimation of excess lifetime cancer risk from exposure to carcinogens. Due to the sporadic nature of the contaminant results, maximum detected contaminant concentrations were used in this assessment. Under current land use

Table 2

POTENTIAL CONTAMINANTS OF CONCERN
FOREST WASTE DISPOSAL SITE RISK ASSESSMENT

CHEMICAL
Acetone
Antimony
Arsenic
Barium
Benzene
Beryllium
Bis(2-ethylhexyl)phthalate
2-Butanone
Cadmium
Chlordane
Chromium
Copper
Cyanide
DDE #
DDT
1,1-Dichloroethane
Dieldrin
Lead
Manganese
Mercury
Methylene Chloride
2-Methyl Phenol
4-Methyl Phenol
Nickel
PAHs*
PBB **
Phenol
Selenium
Silver
Tetrachloroethene
Toluene
1,1,1-Trichloroethane
Trichloroethene
Vanadium
Zinc

*PAHs which are considered carcinogenic assessed as a group: benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd) pyrene.

DDE assessed based on DDT criteria

** PBB lacks numerical criteria. Addressed qualitatively.

conditions, public health effects of concern were identified relative to a direct contact exposure to landfill surface soil and surface drums in the landfill area. Long-term exposures to landfill surface soil by trespassers could result in a reference dose (Rfd) exceedance from lead ingestion and a cancer risk greater than 1×10^{-6} from polyaromatic hydrocarbons (PAH). Figure 7 illustrates the areas of concern under a current land use trespass setting for long-term exposures.

An acute exposure threat, furthermore, exists from the landfill via a direct contact threat from highly concentrated contaminant source materials identified on the landfill surface. An estimated 100-200 drums are exposed at the landfill surface. Samples taken during the RI identified high contaminant concentrations in drums. Results of a liquid sample from a surface landfill drum, for example, detected a single chemical (toluene) at 34 percent by weight.

Under current land use conditions, there is no public health threat from the contaminated groundwater onsite. There are no current users of this onsite groundwater, and groundwater transport modelling has shown, under conservative modelling conditions, that the contaminants will not reach the current offsite groundwater users. The suspected source of this contamination, the onsite lagoons, is scheduled for complete cleanup in late 1988.

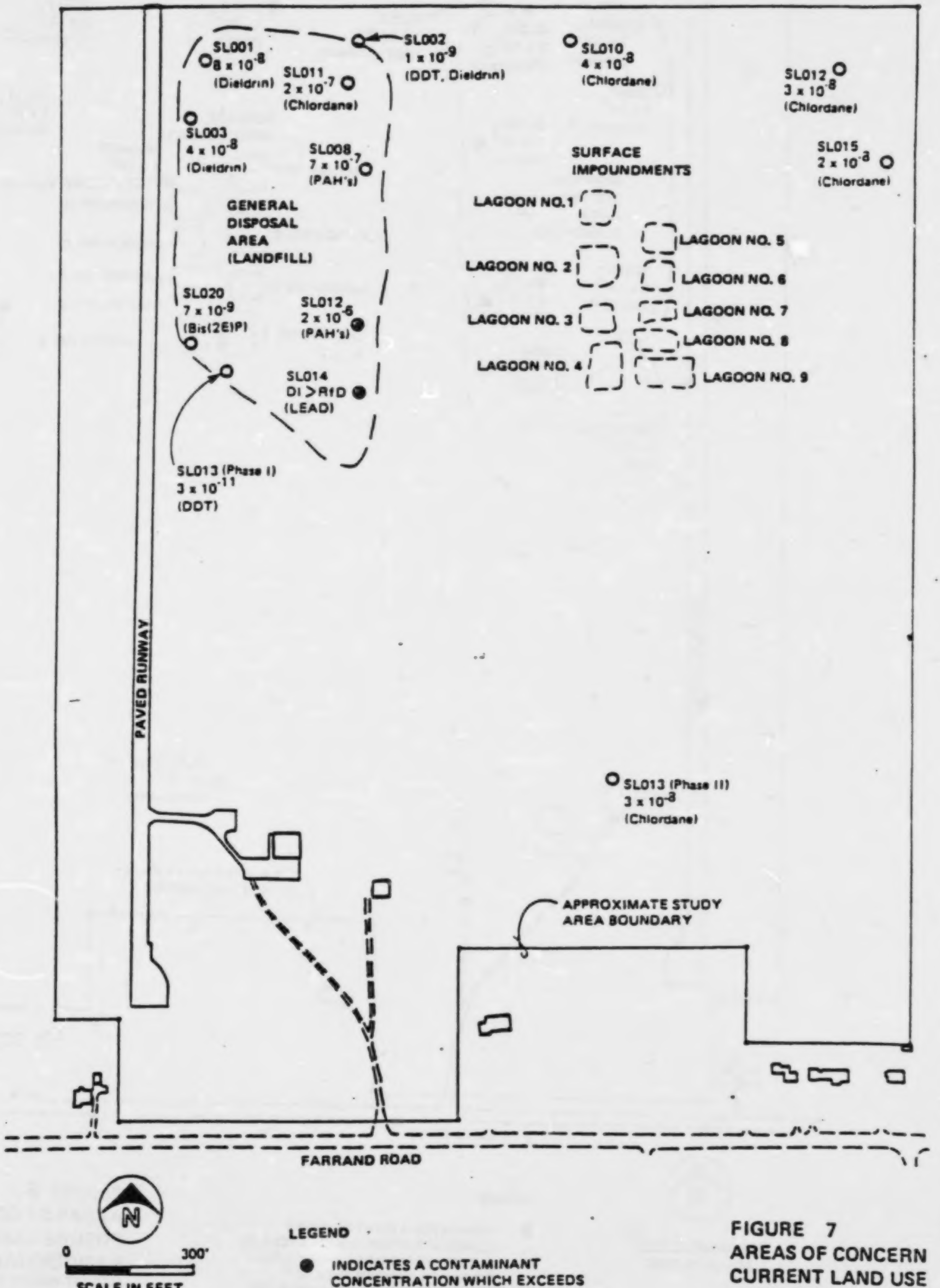
Under future land use conditions, residential and commercial/industrial use of the site was considered. In this setting, similar to the current land use setting, long-term exposure to landfill surface soil could result in reference dose (Rfd) exceedances from lead ingestion and a cancer risk greater than 1×10^{-6} from PAHs. Also similar to the current land use setting, surface exposed drums present an acute direct contact public health threat. Figure 8 illustrates the areas of concern under a future land use residential setting.

Under future land use conditions, the onsite contaminated shallow groundwater may be used for drinking water. Using maximum detected contaminant concentrations, the excess lifetime cancer risk under a residential drinking water scenario is 1×10^{-5}. No reference doses are exceeded under the drinking water scenario.

A significant threat to the groundwater also exists from the landfill waste material, particularly the drummed wastes. These wastes are in an uncontained situation; leachate generation and liquid waste releases may eventually result in groundwater contamination. Due to the high concentrations of wastes in the landfill, an uncontrolled release may result in contamination to current offsite, as well as future onsite, groundwater drinking wells.

Based on the RI data, exposures to contaminants in surface water and sediments under a current use scenario would be of limited concern. The population at risk is small, and releases of contaminants to this media is undocumented. Under a future use scenario, current groundwater contaminants which would eventually discharge to nearby surface water

9.a

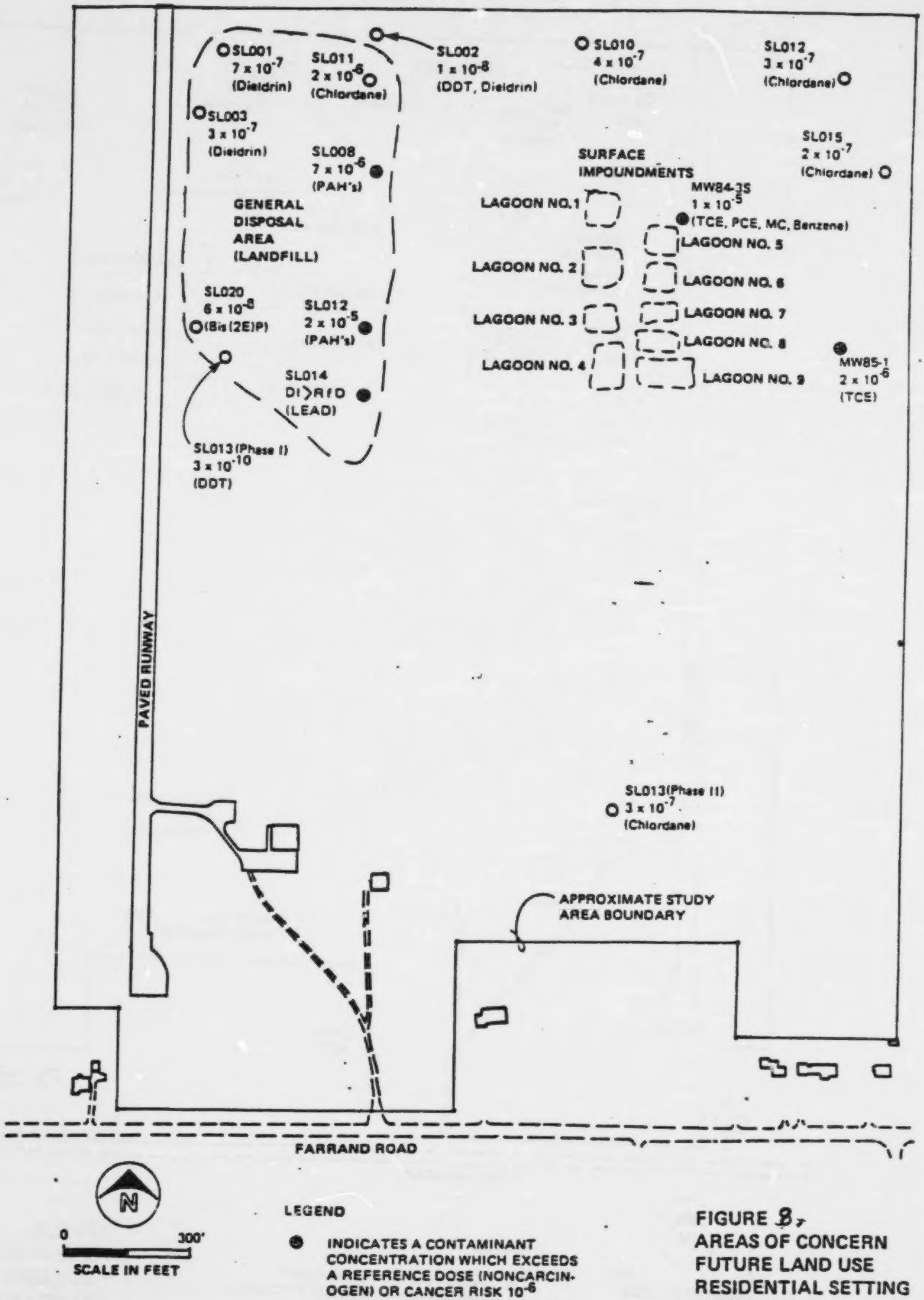

SL001
8 x 10-8
(Dieldrin)
SL002
1 x 10-9
(DDT, Dieldrin)
SL011
2 x 10-7
(Chlordane)
SL010
4 x 10-8
(Chlordane)
SL012
3 x 10-8
(Chlordane)
SL003
4 x 10-8
(Dieldrin)
SL008
7 x 10-7
(PAH's)
SURFACE
IMPOUNDMENTS
SL015
2 x 10-8
(Chlordane)
GENERAL
DISPOSAL
AREA
(LANDFILL)
LAGOON NO. 1
LAGOON NO. 2
LAGOON NO. 3
LAGOON NO. 4
LAGOON NO. 5
LAGOON NO. 6
LAGOON NO. 7
LAGOON NO. 8
LAGOON NO. 9
SL020
7 x 10-9
(Bis(2E)P)
SL012
2 x 10-6
(PAH's)
SL014
DI > RfD
(LEAD)
SL013 (Phase I)
3 x 10-11
(DDT)
PAVED RUNWAY
SL013 (Phase II)
3 x 10-8
(Chlordane)
APPROXIMATE STUDY
AREA BOUNDARY
FARRAND ROAD
N
0
300'
SCALE IN FEET

LEGEND

● INDICATES A CONTAMINANT CONCENTRATION WHICH EXCEEDS A REFERENCE DOSE (NONCARCINOGEN) OR CANCER RISK 10 UNDER THE ASSUMED EXPOSURE

FIGURE 7
AREAS OF CONCERN
CURRENT LAND USE
TRESPASS SETTING
FOREST WASTE RI

9.b


SL001
7 x 10-7
(Dieldrin)
SL011
2 x 10-6
(Chlordane)
SL002
1 x 10-8
(DDT, Dieldrin)
SL010
4 x 10-7
(Chlordane)
SL012
3 x 10-7
(Chlordane)
SL003
3 x 10-7
(Dieldrin)
SL008
7 x 10-6
(PAH's)
SURFACE
IMPOUNDMENTS
SL015
2 x 10-7
(Chlordane)
GENERAL
DISPOSAL
AREA
(LANDFILL)
LAGOON NO. 1
MW84-3S
1 x 10-5
(TCE, PCE, MC, Benzene)
LAGOON NO. 5
LAGOON NO. 2
LAGOON NO. 6
SL020
6 x 10-8
(Bis(2E)P)
SL012
2 x 10-5
(PAH's)
LAGOON NO. 3
LAGOON NO. 7
LAGOON NO. 8
LAGOON NO. 4
LAGOON NO. 9
MW85-1
2 x 10-6
(TCE)
SL014
DI>RfD
(LEAD)
SL013 (Phase I)
3 x 10-10
(DDT)
PAVED RUNWAY
SL013 (Phase II)
3 x 10-7
(Chlordane)
APPROXIMATE STUDY
AREA BOUNDARY
FARRAND ROAD
N
0
300'
SCALE IN FEET

LEGEND

● INDICATES A CONTAMINANT CONCENTRATION WHICH EXCEEDS A REFERENCE DOSE (NONCARCINOGEN) OR CANCER RISK 10^{-6} UNDER THE ASSUMED EXPOSURE CONDITIONS.

FIGURE 8.
AREAS OF CONCERN
FUTURE LAND USE
RESIDENTIAL SETTING
FOREST WASTE RI

bodies, are not likely to cause a public concern. If, however, a release of landfill contaminants to the groundwater were to occur in the future, as this groundwater release discharged to nearby surface water bodies, an unacceptable threat to public health and the environment may result.

Table 3 lists groundwater contaminants detected in the RI compared to Safe Drinking Water Act Maximum Contaminant Levels (MCLs) and Maximum Contaminant Level Goals (MCLGs). In one case, a compound detected from groundwater samples exceeds the MCL. Trichloroethene (TCE) was detected at 11 ug/l. The MCL for TCE is 5 ug/l.

Tables 4A and 4B list the calculated contaminant concentrations of groundwater from the contaminant plume on the eastern edge of the site, before it would discharge to the nearest surface water body. These calculations are based on maximum and mean contaminant concentrations detected. These contaminant concentrations are compared to Federal Ambient Water Quality Criteria (AWQC) for the protection of freshwater aquatic life and State of Michigan Surface Water Quality Guidelines Levels for Protection of Aquatic Life. If this plume is allowed to discharge to the nearest surface water body, it does not appear likely that these criteria will be exceeded.

For complete details of the Risk Assessment, Chapter 6 of the Remedial Investigation (August 28, 1987) and Appendices A and C of the Feasibility Study (January 20, 1988) should be consulted.

COMMUNITY RELATIONS

The Superfund activities at the Forest Waste Disposal Site have been followed closely by the local community and press. The MDNR currently has the lead role in community relations activities at the site. The State and the U.S. EPA have worked together to keep communication with the community open and frequent.

There is an active mailing list of local citizens who receive updates about site activities. Newsletters are periodically mailed to the citizens, updating them on recent site activities. Nine newsletters to date have been sent to the community.

A Citizens Information Committee (CIC) has been formed by the State. This is a group of local citizens and Federal, State, County and local officials with high interest in site activities. This group meets periodically to receive information about site activities and exchange information about community concerns. The committee members serve as liaisons between the local citizens, and MDNR and U.S. EPA.

There have been periodic meetings held at the site to keep the public informed of the site activities. The initial meeting was an RI/FS kick off meeting held May 9, 1984. A more recent meeting was held after finalization of the RI Report on October 1, 1987. At this meeting the

10.a

Table 3

FOREST WASTE DISPOSAL SITE
SUMMARY OF COMPARISON OF MONITORING WELL DATA TO STANDARDS, CRITERIA, AND GUIDELINES

Well	Chemical	MCL	MCLG
Highest Reported Concentration	Benzene		x
	Trans 1,2-Dichloroethene		
	Methylene chloride		
	Tetrachloroethane		
	Trichloroethene	x	x
MWB5-1	Trans 1,2-Dichloroethene *		
	Trichloroethene *	x	x
MWB4-3	Benzene *		x
	Methylene chloride *		
	Tetrachloroethane *		
	Trichloroethene		x
MWB4-1	Methylene chloride		

* Indicates highest detected concentration found in ground water.

TABLE 4A
NO ACTION MAXIMUM DISCHARGE CONCENTRATIONS
COMPARISON TO AWQC AND MICHIGAN STATE SURFACE WATER GUIDELINE LEVELS

FOREST WASTE DISPOSAL SITE

CHEMICAL	NO ACTION CONCENTRATION AT 500' DISTANCE FROM SITE BASED ON MAXIMUM CONCENTRATION FOR WELLS EAST OF LAGOONS (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA FOR THE PROTECTION OF FRESHWATER AQUATIC LIFE: ACUTE OR CMC (UG/L)	FEDERAL: CHRONIC OR CCC (UG/L)	STATE OF MICHIGAN SURFACE WATER QUALITY GUIDELINE LEVELS FOR THE PROTECTION OF AQUATIC LIFE: ACV (UG/L)	STATE: TLSC (UG/L)	CONCENTRATION AT SURFACE WATER LOCATION EXCEEDS FEDERAL CRITERIA: ACUTE OR CMC	FEDERAL: CHRONIC OR CCC	CONCENTRATION AT SURFACE WATER LOCATION EXCEEDS STATE GUIDELINES: ACV	STATE: TLSC
ARSENIC	2.50	360	190	150					
BENZENE	0.11				51				
CHROMIUM +3	0.95	3077	461	117.4					
CHROMIUM +6	0.95	16	11	6					
COPPER	0.93	44.6	27.1	51.9					
CYANIDE	5.94	22	5.2	5			*	*	
T-1,2-DICHLOROETHYLENE	11.2				90				
LEAD	0.66	204	11.1	13.77					
METHYLENE CHLORIDE	4.3			430					
NICKEL	5.12	3079	201	191.9					
SILVER	0.5	21.8		0.15				*	
TOLUENE	11			100					
TETRACHLOROETHYLENE	0.19			70					
TRICHLOROETHYLENE	1.23			94					
1,1,1-TRICHLOROETHANE	15			120					
ZINC	70.3	260	243	225					

CCC - CONTINUOUS CRITERION CONCENTRATION = FOUR DAY AVERAGE NOT TO EXCEED THIS CONCENTRATION MORE THAN ONCE EVERY THREE YEARS ON THE AVERAGE.
CMC - CONTINUOUS MAXIMUM CONCENTRATION = ONE HOUR AVERAGE NOT TO EXCEED THIS MAXIMUM CONCENTRATION MORE THAN ONCE EVERY THREE YEARS ON THE AVERAGE.
ACV - AQUATIC CHRONIC VALUE - PROPOSED GUIDELINES, RULE 57(2), ACT 245, JANUARY 27,1987
TLSC - TERRESTRIAL LIFE CYCLE SAFE CONCENTRATION - PROPOSED GUIDELINES, RULE 57(2), ACT 245, JANUARY 27, 1987
ICRV - CANCER RISK VALUE - PROPOSED GUIDELINES, RULE 57(2), ACT 245, JANUARY 27,1987
PH - PH IN STANDARD UNITS
H - HARDNESS, CALCULATED ACCORDING TO STANDARD METHODS WHERE HARDNESS (H) IN MG/L AS CACO3 = 2.497 (Ca (MG/L)) + 4.118 (Mg (MG/L))
H = 266 MG/L BASED ON SURFACE WATER CONCENTRATION AT SW007
PH = 7 STANDARD UNITS
* - INDICATES THAT SURFACE WATER CONCENTRATION EXCEEDS CRITERIA OR GUIDELINE

NOTE: ALL COMPOUNDS/ELEMENTS FOUND IN GROUNDWATER WERE COMPARED TO ALL FEDERAL AMBIENT WATER QUALITY CRITERIA AND STATE OF MICHIGAN PROPOSED GUIDELINES FOR POINT SOURCE DISCHARGE TO SURFACE WATER (ACT 245, RULE 57(2), JANUARY 27, 1987)

10.b

10.C

TABLE 4-B
NO ACTION MEAN DISCHARGE CONCENTRATIONS
COMPARISON TO AWQC AND MICHIGAN STATE SURFACE WATER GUIDELINE LEVELS

FOREST WASTE DISPOSAL SITE

CHEMICAL	NO ACTION CONCENTRATION AT 500' DISTANCE FROM SITE BASED ON MEAN CONCENTRATION FOR WELLS EAST OF LAGOONS (UG/L)	FEDERAL AMBIENT WATER QUALITY CRITERIA FOR THE PROTECTION OF FRESHWATER AQUATIC LIFE		STATE OF MICHIGAN SURFACE WATER QUALITY GUIDELINE LEVELS FOR THE PROTECTION OF AQUATIC LIFE		CONCENTRATION AT SURFACE WATER LOCATION EXCEEDS FEDERAL CRITERIA		CONCENTRATION AT SURFACE WATER LOCATION EXCEEDS STATE GUIDELINES	
		ACUTE OR CMC (UG/L)	CHRONIC OR CCC (UG/L)	ACV (UG/L)	TLSC (UG/L)	ACUTE OR CMC	CHRONIC OR CCC	ACV	TLSC
ARSENIC	0.42	360	190	150	51	.	.	.	.
BENZENE #	0.17					.	.	.	.
CHROMIUM +3	0.14	3077	461	117.4		.	.	.	.
CHROMIUM +6	0.14	16	11	6		.	.	.	.
COPPER	0.09	44.6	27.1	51.9		.	.	.	.
CYANIDE	6.5	22	5.2	5	90	.	.	.	.
T-1,2-DICHLOROETHYLENE #	27.1					.	.	.	.
LEAD	0.03	284	11.1	13.77		.	.	.	.
METHYLENE CHLORIDE #	22.7			430		.	.	.	.
NICKEL	1.42	3879	201	191.9		.	.	.	.
SILVER	0.02	21.8		0.15		.	.	.	.
TOLUENE #	14.2			100		.	.	.	.
TRICHLOROETHYLENE #	1.9			94		.	.	.	.
1,1,1-TRICHLOROETHANE #	30.3			120		.	.	.	.
ZINC	11.6	260	243	225		.	.	.	.

CCC - CONTINUOUS CRITERION CONCENTRATION = FOUR DAY AVERAGE NOT TO EXCEED THIS CONCENTRATION MORE THAN ONCE EVERY THREE YEARS ON THE AVERAGE.
CMC - CONTINUOUS MAXIMUM CONCENTRATION = ONE HOUR AVERAGE NOT TO EXCEED THIS MAXIMUM CONCENTRATION MORE THAN ONCE EVERY THREE YEARS ON THE AVERAGE.
ACV - AQUATIC CHRONIC VALUE - PROPOSED GUIDELINES, RULE 57(2), ACT 245, JANUARY 27,1987
TLSC - TERRESTRIAL LIFE CYCLE SAFE CONCENTRATION - PROPOSED GUIDELINES, RULE 57(2), ACT 245, JANUARY 27, 1987
- ORGANIC MEANS REPRESENT MEANS FOR TWO WELLS, MW05-1S AND MW04-2S
PH - PH IN STANDARD UNITS
H - HARDNESS, CALCULATED ACCORDING TO STANDARD METHODS WHERE HARDNESS (H) IN MG/L AS CACO3 = 2.497 (Ca (MG/L)) + 4.118 (Mg (MG/L))
H = 246 MG/L BASED ON SURFACE WATER CONCENTRATION AT SW007
PH = 7 STANDARD UNITS
* - INDICATES THAT SURFACE WATER CONCENTRATION EXCEEDS CRITERIA OR GUIDELINE

NOTE: ALL COMPOUNDS/ELEMENTS FOUND IN GROUNDWATER WERE COMPARED TO ALL FEDERAL AMBIENT WATER QUALITY CRITERIA AND STATE OF MICHIGAN PROPOSED GUIDELINES FOR POINT SOURCE DISCHARGE TO SURFACE WATER (ACT 245, RULE 57(2), JANUARY 27, 1987) public was provided with a handout which outlined the general categories of remedial response activities under consideration for the final action at the site.

A public meeting was held on February 17, 1988, to discuss the public comment draft FS. The public comment period was held January 29 through February 27, 1988. The attached responsiveness summary addresses specific comments and questions raised at the February 17, 1988, meeting and during the public comment period.

ENFORCEMENT

U.S. EPA has identified approximately twenty-five Potentially Responsible Parties (PRPs) for the Forest Waste Disposal site. U.S. EPA identified the PRPs on the basis of site records and responses to information requests submitted pursuant to Section 104 (e) of CERCLA.

A PRP steering committee has been established since May 1986 when the PRPs were noticed for the operable unit lagoon remedial action. The PRPs have been active in exchanging information about the site since that time. The PRPs have reviewed and commented on the U.S. EPA RI report, as well as conducted and submitted their own FWD Endangerment Assessment and Feasibility Study. Two meetings discussing approaches to site remediation were held with the PRPs prior to issuance of the U.S. EPA Public Comment Draft FS.

On January 13, 1988, representatives from U.S. EPA and MDNR met with the PRPs in Lansing, Michigan to discuss the PRP recommend proposal in the Geraghty and Miller Feasibility Study, dated December 18, 1987 for a combined remedial action on the site lagoons, landfill, and groundwater. The PRP proposal included: fence, site restrictions, groundwater monitoring, pumping lagoon liquids for offsite treatment and disposal at a RCRA facility, backfill lagoons and cover with a low permeability cap, removal and offsite disposal of approximately 100 surface drums in the landfill, and cover landfill with a low permeability cap. At that meeting, U.S. EPA provided the PRPs with an updated outline of site remedial action goals, and alternatives currently under consideration in the draft U.S. EPA FS. This outline was also supplied to the public repository.

The discussions at this meeting focused on the protection needed for the site shallow aquifer. The Agencies maintained the position that this aquifer is a drinking water aquifer. The Agencies also expressed concerns that the PRP proposed landfill action would not provide adequate protection to the shallow aquifer.

Discussions at this meeting also focused on the preference cited in CERCLA 121(b). U.S. EPA representatives explained that the preference was for treatment of hazardous substances to significantly and permanently reduce their toxicity, mobility, and volume, and that containment remedies, which reduce mobility of hazardous substances to the groundwater do not satisfy this preference. U.S. EPA indicated that the PRP proposal does not satisfy this preference.

U.S. EPA also stated that the lagoon operable unit remedy configuration was not negotiable. This remedy was selected by U.S. EPA in June 1986 and is currently in design phase. Several discussions with the PRPs about this remedy took place before and immediately after the remedy was selected. The PRPs were again offered the opportunity to undertake the lagoon remedy as configured in the June 1986, ROD.

On January 22, 1988, representatives from U.S. EPA and MDNR met with the PRPs in Chicago, Illinois. The PRPs presented a new site cleanup proposal (dated January 21, 1988) which included: fence, site restrictions, removal of approximately 100 surface landfill drums for offsite disposal, cover landfill with a low permeability cap, construct slurry wall around landfill perimeter, construct dewatering system at site perimeter with onsite treatment and discharge, 30-year long-term maintenance of cap and periodic groundwater monitoring, and pumping and treating shallow aquifer in the eastern area of the site. The PRP proposal also included a lagoon remediation for offsite RCRA disposal of liquids, offsite RCRA disposal of six inches of lagoon solids, and covering lagoons with a low permeability engineered cap.

The above comment from the January 13, 1988, meeting on lagoon cleanup was reiterated to the PRPs by U.S. EPA.

Concerns from the Agencies about the January 21, 1988, PRP proposal were expressed, and included:

1. A concern about the ability of a slurry wall to contain wastes associated with drums at the site.
2. A concern about meeting the CERCLA 121(b) preference for treatment.
3. A concern that the containment system be maintained beyond 30 years.

The PRPs expressed concerns and an opposition to any landfill excavation. The PRPs expressed concerns about short-term risks from landfill excavation. The PRPs expressed concerns about defining the limits of a partial landfill excavation.

On January 28, 1988, Special Notice letters pursuant to Section 122 (e) of SARA of 1986 were sent to the PRPs.

The most recent negotiations with the PRPs was held February 23, 1988, in Chicago, Illinois and included representatives from U.S. EPA, MDNR, and the PRPs. The PRPs reiterated the merits of their January 21, 1988, proposal. MDNR representatives discussed their concerns about the unknown extent of drum excavation in the U.S. EPA preferred Alternative SRCVT. The PRPs reiterated their concern about any landfill excavation activity.

The January 21, 1988, PRP proposal is considered a good faith proposal. The moratorium for initiation of remedial action at the site will extend until June 8, 1988.

DOCUMENTATION OF SIGNIFICANT CHANGES [SECTION 117(b)]

The incineration treatment component of the selected landfill remedial action, Alternative SRCVT, and landfill Alternatives RDN and RDF was scoped in the FS and Proposed Plan to be implemented at a compliant offsite RCRA incinerator. Cost information available at the time of the FS suggested that use of an offsite incinerator would be less costly than use of an onsite incinerator for the volumes of waste proposed in these alternatives (see page 5-6 of the FS). Recent cost information has suggested that an onsite incineration may be less costly than offsite incineration for the volumes of waste slated for incineration in Alternatives SRCVT, RDN, and RDF.

These remedies are best configured to allow for the option of incinerating these wastes onsite or offsite, depending on which option is less costly at the time of remedy implementation. The short-term risks to the community during onsite incineration are manageable and balance against the risks to the community during the offsite transport of wastes in the offsite incineration option. An onsite incineration option was fully developed and presented to the public for comment in Alternative RTD. No comment specifically directed to onsite incineration was received during the Public Comment Period.

The selected landfill Alternative SRCVT will be configured to include onsite or offsite incineration of the excavated drummed wastes. In the bidding and award of this construction job, the less costly incineration option may be incorporated into the remedy.

ALTERNATIVES DEVELOPMENT

Remedial Action Goals

General remedial action goals outlined in the National Contingency Plan (NCP) (40 CFR Part 300) and CERCLA as amended by SARA were reviewed, and FWD site specific goals were established. In evaluating the findings of the RI and Risk Assessment, two separate areas of concern, or operable units, were identified at the site: 1) soil and landfill contents; and 2) groundwater at the eastern end of the site. Specific goals for each of these two operable units follow.

The specific remedial action goals for the soil and landfill contents operable units are:

- Prevent direct contact exposure to soil or landfill sources that contain contaminant levels in excess of target concentrations for:
  - Noncarcinogenic health effect protection (based on reference doses)

  - Excess lifetime cancer risk in the range of 10^{-4} to 10^{-7}

- o Prevent migration of contaminants from the soil or sources in the landfill to a drinking water aquifer that would contaminate groundwater to concentrations:

  - Greater than the MCLs

  - Exceeding the lifetime health advisories

  - Exceeding levels for noncarcinogenic health effect protection (based on reference doses)

  - Resulting in an excess lifetime cancer risk range of 10^{-4} to 10^{-7}

- o Prevent migration of contaminants from the soil and sources in the landfill to a surface water body that would result in contamination to levels greater than the Federal Ambient Water Quality Criteria or State of Michigan Surface Water Quality Guideline Levels for the Protection of Aquatic Life.

- o Control future release of contaminants to ensure protection of human health and the environment (SARA Section 121 (d)).

- o Consider a preference for remedies that permanently and significantly reduce toxicity, mobility, or volume of hazardous substances through treatment to the greatest extent practicable (SARA Sec 121(b).

The specific remedial action goals for the groundwater operable unit are:

- o Assure the quality of groundwater in drinking water aquifers and prevent migration of contaminants to a drinking water aquifer that would contaminate groundwater to concentrations:

  - Greater than the MCLs

  - Exceeding the lifetime health advisories

  - Exceeding levels for noncarcinogenic health effect protection (based on reference doses)

  - Exceeding a lifetime cancer risk of range 10^{-4} to 10^{-7}

- o Prevent migration of contaminants to surface water body that would result in contamination to levels greater than the Federal Ambient Water Quality Criteria or State of Michigan Surface Water Quality Guideline Levels for the Protection of Aquatic Life.

The identified shallow and deep aquifers, as well as the bedrock aquifer underneath the FWD site, are considered drinking water aquifers. The shallow aquifer is not currently used as a drinking water source. This aquifer, however, if unaffected by the site contaminants, would be of sufficient quality and quantity to be used as a drinking water source.

Technology Screening

Appropriate remedial technologies process options were screened in the FS. Fifty-five soils and landfill contents operable unit remedial technology process options were initially identified for screening. Thirty-four groundwater operable unit remedial technology process options were initially identified for screening. These process options were evaluated relative to their ability to achieve the remedial action goals, ability to meet Federal and State applicable or relevant and appropriate regulations, and implementability relative to site conditions. Twenty-seven soil and landfill operable unit process options, and sixteen groundwater operable unit process options remained after initial screening.

A second screening of technology process options was performed based on technology performance (action accomplished), reliability (proven operation), implementability (ease of construction), safety associated with construction and operation, and relative costs. After this screening, thirteen soil and landfill contents operable unit remedial process options, and seven groundwater operable unit remedial process options were retained for development of remedial alternatives. Only technologies which survived screening were used to formulate remedial alternatives.

Alternatives Development

Using the established remedial action goals, the FS then assembled the identified technologies into operable unit remedial alternatives (combinations of technologies to remediate the operable units). Alternatives which encompass a range of choices for remediating the operable units were developed. This range included, for each operable unit, to the extent feasible:

- A no action alternative.

- At least one alternative that involves containment of waste with little or no treatment, but provides protection of human health and the environment by preventing potential exposure or by reducing the mobility of the waste.

- Treatment alternatives ranging from one that would eliminate the need for long-term management (including monitoring) at the site to one that would use treatment as a principal element to reduce the toxicity, mobility, or volume of contaminants.

Description of Alternatives

The remedial alternatives are organized into two groups: a list of eight alternatives to address the soil and landfill contents operable unit, and list of four alternatives to address the groundwater operable unit.

All alternatives developed include implementation of the lagoon operable unit selected remedy.

1. Landfill Soil and Source Material

Alternative NA - - No Action

Total Present Worth:	$0
Construction Cost:	$0
Present Worth O&M Cost:	$0
Annual O&M Cost:	$0
Time to Implement:	none

Alternative NA assumes that no further corrective actions take place and that no restrictions are placed on future uses at the site. The fence that was installed in 1984 will remain onsite. Repair and maintenance of the fence will be continued by MDNR. This alternative also recognizes that liquids, soil, sediment, and sludges associated with the lagoon wastes will be removed as planned for in the lagoon operable unit selected remedy. This alternative is considered as a baseline scenario to which other alternatives can be compared.

Alternative SR - Site Restrictions

Total Present Worth:	$1,430,000
Construction Cost:	$74,000
Present Worth O&M Cost	$1,390,000
Annual O&M Cost:	$202,500
Time to Implement:	3 Months

The major components of Alternative SR are: access restrictions (deed limitations), fence, and monitoring.

Deed limitations would be placed on the Forest Waste property and areas immediately surrounding the site. The deed limitations would prohibit excavation of soil and/or landfill contents that might occur during future property development. The fence that was installed onsite in 1984 will remain. Regular repair and maintenance of the fence will be performed by MDNR.

Contaminant migration from the soil and landfill contents would be assessed through a groundwater monitoring program.

Eight new monitoring wells (five shallow, three deep) would be installed around the landfill perimeter. A total of 21 wells (15 shallow, 6 deep) would be sampled and analyzed to detect changes in the groundwater characteristics under the landfill area.

Sampling and analysis of groundwater would be performed quarterly during the first 5 years and semiannually thereafter. Samples would be analyzed for CLP organic and inorganic parameters, PBBs, dioxins, and conventional parameters such as chloride, sulfate, nitrate, nitrite, specific conductivity, and alkalinity. Water levels of the monitoring wells would be taken at the time of sampling and gradients would be calculated and compared to existing data.

Alternative SRC - Site Restrictions with Soil Cover

Total Present Worth:	$2,070,000
Construction Cost:	$663,000
Present Worth O&M Cost:	$1,390,000
Annual O&M Cost:	$206,500
Time to Implement:	2-3 Weeks

The major components of Alternative SRC are: access restrictions (deed limitations), fence, monitoring, and soil cover. Access restrictions, fence, and monitoring are similar to Alternative SR. Alternative SRC adds a soil cover over the contaminated soils and landfill area.

A 2-foot minimum thick soil cover would be placed over the landfill and associated contaminated soil to prevent direct contact with the contaminated materials. The cover would not be designed to prevent infiltration of precipitation into the landfill. The cover would consist of onsite borrow soil. Prior to placing the cover, the landfill area would be graded to fill existing depressions, eliminate any sharp grade changes, and improve surface runoff. After placement, the cover would be seeded and shaped to maximize evapotranspiration and minimize water ponding over the contaminated area.

Maintenance and repair of the soil cover would be needed periodically.

Alternative SRCV - Site Restrictions with Cap and Vertical Barrier

Total Present Worth:	$9,700,000
Construction Cost:	$8,006,000
Present Worth O&M Cost:	$1,554,000
Annual O&M Cost:	$250,000
Time to Implement:	12 Months

The major components of Alternative SRCV are: access restrictions (deed limitations), fence, monitoring, RCRA cap, and vertical barrier.

Access restrictions and monitoring are similar to Alternative SRC. A new fence would be installed around the landfill area to protect the cap and prevent access to gas vents and groundwater monitoring manholes. The foot of the fence would be buried.

Alternative SRCV uses a multilayer cap and adds a barrier around the landfill perimeter. The cap and vertical barrier are intended to effectively contain the contaminants by preventing infiltration into the landfill area and contaminated soil (cap), and restricting groundwater movement within the landfill (vertical barrier).

The RCRA cap would be constructed as specified in RCRA regulations and guidance. A gas collection system for the cap would be installed.

A soil-bentonite slurry wall vertical barrier would be constructed in the native soil surrounding the contaminated area. The wall would be approximately two feet wide and 35 feet deep. The bottom of the wall would be keyed into the low permeability glacial till layer underlying the site. A dewatering system would be installed inside the wall to lower the water level under the landfill, creating a head differential toward the landfill and collecting any releases of liquid wastes inside the landfill. No adverse effects to the wetlands east of the site is anticipated from this dewatering and groundwater diversion.

Operation and maintenance for Alternative SRCV would include routine monitoring and periodic repair of the cap, vertical barrier, and gas collection system. Groundwater collected from inside the landfill (leachate) would be periodically collected and properly disposed of or treated. Proper treatment or disposal of the landfill leachate would be determined in design activities after leachate quality is determined.

Alternative SRCVT - Site Restrictions with Cap and Vertical Barrier, Source Drum Removal, and Treatment

Total Present Worth:	$22,530,000
Construction Cost:	$20,837,000
Present Worth O&M Cost:	$1,554,000
Annual O&M Cost:	$250,500
Time to Implement:	12 Months

The major components of Alternative SRCVT are: access restrictions, monitoring, fence, RCRA cap, vertical barrier, limited drum removal and incineration. All components of this remedy, with the exception of the drum removal and incineration, are similar to Alternative SRCV.

Prior to the containment activity, the areas of the landfill with concentrated drummed wastes would be excavated, and drummed wastes would be incinerated onsite or transported offsite for RCRA incineration. Soils saturated with contamination from the excavated drums would also be incinerated onsite or transported offsite for RCRA incineration. The drum removal activity would be limited in scope and would not include excavation of the entire 11 acre landfill.

An estimated 4,000 drums of waste and 1,000 cubic yards (4,000 drums) of contaminated saturated soil would be excavated from the landfill for treatment. The exact extent of the area of concentrated drums would be determined in remedial design phase. The FS estimate for the number of drums is conservative, based on currently available information. The cost estimate for this remedy, therefore, is conservative. In remedial design, the cost estimate for this remedy would be more refined.

Air monitoring would be conducted during excavation and the potential onsite incineration to evaluate exposure risks from fugitive dust generated during excavation and to assure compliance with air quality standards.

Stormwater runon/runoff would be controlled during excavation through grading, the construction of berms, etc., as necessary to minimize the amount of stormwater drainage that contacts contaminated excavation materials and to ensure that any contaminated stormwater is collected and disposed of with the excavated drums.

Alternative RDN - Removal, Source Drum Treatment, and Onsite Disposal

Total Present Worth:	$29,620,000
Construction Cost:	$28,681,000
Present Worth O&M Cost:	$746,000
Annual O&M Cost:	$102,000
Time to Implement:	5 Years

The major components of Alternative RDN are: complete waste removal, onsite or offsite incineration of drummed wastes, redisposal of remaining wastes in onsite RCRA-type landfill, and RCRA landfill monitoring.

Approximately 200,000 cubic yards of material would be excavated from the landfill area, resulting in a volume of 260,000 cubic yards of loosened material. Air monitoring and stormwater drainage controls would be performed during excavation as described in Alternative SRCVT. It is estimated that approximately 4,000 drums of waste materials would be encountered. The drums would be incinerated onsite or transported offsite for RCRA incineration treatment.

Remaining bulk waste would be treated as necessary onsite to remove free liquids, redisposed into a RCRA-type landfill, and covered with a RCRA cap. The newly constructed landfill cell would be located within the previous area of waste disposal. Groundwater monitoring would be performed as required by RCRA post-closure requirements.

Operation and maintenance would include leachate collection and disposal, periodic groundwater monitoring, repair of the landfill cap, and gas monitoring.

Alternative RDF - Removal, Source Drum Treatment, and Offsite Disposal

Total Present Worth:	$61,920,000
Construction Cost:	$61,899,000
Present Worth O&M Cost:	$0
Annual O&M Cost:	$0
Time to Implement:	2 Years

Components of Alternative RDF are similar to Alternative RDN, with the exception of the disposal facility. Materials slated for disposal would be taken to an offsite RCRA-approved landfill.

There would be no long-term operation and maintenance activities for this alternative.

Alternative RTD - Removal, Treatment and Disposal

Total Present Worth:	$130,500,000
Construction Cost:	$66,364,000
Present Worth O&M Cost:	$63,888,000
Annual O&M Cost:	$16,742,000
Time to Implement:	5 Years

The major components of Alternative RTD are: 1) removal of all contaminated landfill materials, 2) treatment of all combustible excavated materials in an onsite RCRA-type incinerator, 3) dewatering, as necessary, of the noncombustible excavated materials onsite, and 4) disposal, as necessary, of treatment residuals and untreated materials in an onsite RCRA-type landfill.

The operation and maintenance would be as described in the Alternative RDN. The onsite treatment system would require trained operators. During excavation and treatment, appropriate air monitoring and, as necessary, air controls would be exercised. Stormwater drainage controls would also be exercised.

2. Groundwater

Alternative NA - No Action

Total Present Worth:	$0
Construction Cost:	$0
Present Worth O&M Cost:	$0
Annual O&M Cost:	$0
Time to Implement:	none

This alternative is described under the soil and landfill contents operable unit section. No further action is taken to address the contaminants currently identified in the groundwater on the eastern side of the site.

The identified contaminants would be allowed to migrate with groundwater flow. Any change in groundwater quality would be due to natural dilution, adsorption and biological degradation. No monitoring would be performed, therefore, no further information about groundwater quality would be gained.

Alternative SR - Site Restrictions

Total Present Worth:	$1,290,000
Construction Cost:	$24,000
Present Worth O&M Cost:	$1,254,000
Annual O&M Cost:	$189,500
Time to Implement:	2-3 Weeks

The access restrictions component would be as described in the soil and landfill contents Alternative SR. Deed restrictions would be implemented to specifically prevent installation of new drinking water wells in the shallow aquifer at the site or in adjacent areas.

Changes in the location and concentration of the groundwater contamination would be assessed through a groundwater monitoring program. RI data collected on the groundwater to date indicate that with one exception, all groundwater remedial action goals are currently being met relative to the quality of affected groundwater (see Remedial Action Goals Section). The exception met is a sample of groundwater from onsite monitoring well number MW85-1 that detected trichloroethane (TCE) at 11 ug/l. The MCL for TCE is 5 ug/l. The monitoring would be configured such that if groundwater quality at the site boundary is anticipated to exceed any of the groundwater remedial action goals, a remedial action plan for groundwater cleanup will be developed.

The monitoring program would include two new monitoring wells (deep) installed downgradient of the plume. A total of 14 wells (9 shallow, 5 deep) would be sampled and analyzed to detect plume movement or changes in the concentrations. In addition, a newly installed or currently available upgradient background well would be sampled to establish background groundwater quality.

Sampling and analysis of groundwater would be performed quarterly during the first 5 years and then the program would be reevaluated for changes in analyses and sampling frequency. Samples would be analyzed for CLP organic and inorganic parameters and for conventional parameters such as chloride, sulfate, nitrate, nitrite, specific conductivity, and alkalinity. Water levels of the monitoring wells would be take at the time of sampling and gradients would be calculated and compared to existing data.

Annually, the quarterly results of the sampling and analysis program would be averaged and compared to the groundwater remedial action goals. At the site boudary (monitoring well nos. MW85-1S and MW85-2S), if on an average annual basis, the quality of the groundwater is greater than MCLs, exceeding lifetime health advisories, exceeding levels for noncarcinogenic health effect protection (based on reference doses) or exceeding a lifetime cancer risk range of 10^{-4} to 10^{-7}; or offsite, upgradient of the wetlands, (monitoring well nos. MW86-4S, MW86-3S, and MW86-2S) if on an average annual basis the quality of the groundwater is greater than Federal Ambient Water Quality Criteria or State of Michigan Surface Water Quality Guideline Levels for the Protection of Aquatic Life, a plan for further groundwater remedial action would be evaluated.

Alternative CTGD - Collection, Onsite Treatment, and Discharge

Total Present Worth:	$3,760,000
Capital Cost:	$326,000
Present Worth O&M Cost:	$3,306,000
Annual O&M Cost:	$465,000
Time to Implement:	15 Years

The major components of Alternative CTGD are: collection of contaminated groundwater from the shallow aquifer, treatment of that water as necessary to meet NPDES discharge permit requirements, and discharge of the water to the Butternut Creek.

The groundwater collection system would consist of groundwater extraction wells. Collection pipes from the wells would discharge to a common sump. Water would be treated, as necessary, with granulated activated carbon to assure compliance with NPDES permit discharge limits. The water would then be discharged to the Butternut Creek.

Alternative CTP - Collection and Offsite Treatment

Total Present Worth:	$2,550,000
Capital Cost:	$205,000
Present Worth O&M Cost:	$2,319,000
Annual O&M Cost	$329,500
Time to Implement:	15 Years

The major components of Alternative CTP are collection of contaminated groundwater from the shallow aquifer and offsite treatment of the water at a Publicly Owned Treatment Works (POTW).

Collection of groundwater of Alternative CTP is similar to Alternative CTGD. This alternative adds onsite groundwater storage prior to transport offsite and treatment at a POTW. The possibility exists that pretreatment prior to discharge to the POTW will be required for compliance with POTW local limits and Federal and State pretreatment regulations.

SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

Each of the alternatives were evaluated using a number of evaluation factors. The regulatory basis for these factors comes from the National Contingency Plan and Section 121 of SARA (Cleanup Standards). Section 121(b)(1) states that, "Remedial actions in which treatment which permanently and significantly reduces the volume, toxicity or mobility of the hazardous substances, pollutants, and contaminants is a principal element, are to be preferred over remedial actions not involving such treatment. The offsite transport and disposal of hazardous substances or contaminated materials without such treatment should be the least favored alternative remedial action where practicable treatment technologies are available." Section 121(b)(1) also states that the following factors shall be addressed during the remedy selection process:

(A) the long-term uncertainties associated with land disposal;
(B) the goals, objectives and requirements of the Solid Waste Disposal Act;
(C) the persistence, toxicity, mobility, and propensity to bioaccumulate of such hazardous substances and their constituents;
(D) short- and long-term potential for adverse health effects from human exposure;
(E) long-term maintenance costs;
(F) the potential for future remedial action costs if the alternative remedial action in question were to fail; and
(G) the potential threat to human health and the environment associated with excavation, transportation, and redisposal, or containment.

Section 121 of SARA requires that the selected remedy is to be protective of human health and the environment, cost-effective, and use permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

Alternatives were evaluated using current U.S. EPA guidance, including: "Interim Guidance on Superfund Selection of Remedy" dated December 24, 1986 and "Additional Interim Guidance for FY'87 Records of Decision' dated July 24, 1987. In the July 24, 1987, guidance, the following nine evaluation factors are referenced:

1. Overall Protection of Human Health and the Environment addresses whether or not a remedy provides adequate protection, and describes how risk are eliminated, reduced or controlled through treatment, engineering controls, or institutional controls.

2. Compliance with ARARs addresses whether or not a remedy will meet all of the applicable or relevant and appropriate (ARARs) requirements of other environmental statutes and/or provide grounds for invoking a waiver. (See discussion below).

3. Long-term effectiveness and permanence refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once cleanup goals have been met.

4. Reduction of toxicity, mobility, or volume is the anticipated performance of the treatment technologies a remedy may employ.

5. Short-term effectiveness involves the period of time needed to achieve protection and any adverse impact on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

6. Implementability is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution.

7. Cost includes capital and operation and maintenance costs.

8. Support Agency Acceptance indicates whether, based on its review of the RI/FS and Proposed Plan, the support agency (MDNR) concurs, opposes, or has no comment on the preferred alternative.

9. Community Acceptance indicates the public support of a given remedy. This criteria is discussed in the Responsiveness Summary.

The analysis that follows was performed using the above factors as they apply to each of the developed alternatives.

I. Soil and Landfill Contents

A. Alternatives Evaluation

Alternative NA

No protectiveness is provided by this remedy since no further action takes place at the site. Short-term unacceptable risks remain from the contaminated landfill surface soil, both to trespassers under the current use scenario, and residents under a future use scenario. Short-term acute unacceptable risk from drummed waste on the landfill surface also remain under both current use and future use scenarios. The unacceptable long-term release of contaminants from the landfill to the groundwater also remains. This long-term risk to groundwater threatens current groundwater users and future residential onsite users of the groundwater, as well as surface water bodies near the site, which receive groundwater discharge. No treatment to reduce toxicity, mobility, or volume of hazardous substances is included as part of this remedy. This alternative does not afford any permanence. The remedy will not meet the identified Federal and State ARARs for the landfill.

No construction activities are associated with this remedy. Therefore, there are no construction implementability issues. This remedy will take no time to implement. This remedy is not supported by the State of Michigan.

The estimated capital cost of this remedy is $0. The total present worth is $0. Estimated annual operation and maintenance (O&M) cost is $0.

Alternative SR

Some short-term protectiveness is provided by this remedy by reducing the threat of direct contact risks from the landfill soil and surface materials. This method of providing protectiveness, however, is not reliable, since prevention of trespassers in current and future use scenarios cannot be assured. The long-term risk of a release of landfill wastes to the groundwater is not mitigated. The groundwater monitoring will only provide the information that a release has occurred, should that be the case. No treatment to reduce toxicity, mobility, or volume of hazardous substances is included as part of this remedy. This alternative does not afford any permanence. Protection of human health and the environment provided by this remedy is not adequate. This remedy will not meet the identified Federal and State ARARs for the landfill closure.

This remedy can be easily implemented within a few weeks. Activities necessary to implement the remedy will not increase risks of exposure to the community or workers. This alternative is easy to maintain and is easily modified. This remedy is not supported by the State of Michigan.

The estimated capital cost of this remedy is $74,000. The total present worth is $1,430,000. The estimated annual O&M cost is $202,500.

Alternative SRC

Short-term protectiveness is provided with this remedy by reducing existing risks from direct contact threats from landfill soil and surface materials. These materials are covered with a minimum of two feet of soil. This method should be reliable in alleviating the direct contact threat to trespassers. Deed restrictions, furthermore, may reduce trespassing. The long-term risk of a release of landfill waste to the groundwater is not, however, mitigated. Surface precipitation would be able to percolate through the cover, and serve as a potential solvent for landfill wastes, resulting in generation of leachate. Such leachate, and liquids wastes currently in the landfill, may migrate to, and contaminate groundwater. The groundwater monitoring will provide information that a release has occurred, should that be the case. No treatment to reduce toxicity, mobility, or volume of hazardous substances is included in this remedy. This alternative affords little permanence. Adequate protection of human health and the environment is not provided by this remedy. This remedy does not meet the identified Federal and State ARARs for the landfill. In particular, the soil cover does not comply with RCRA 40 CFR Section 264.310 and Michigan Act 64 requirements for cover at final hazardous waste landfill closure.

This remedy can be easily implemented with some quality control in approximately three months. Risks to the surrounding community during construction are negligible, and risks to construction workers are minimal. This alternative requires minimal maintenance. Modifications to the remedy would be simple, potentially requiring some cover alterations. This remedy is not supported by the State of Michigan.

The estimated capital cost of this remedy is $663,000. The total present worth is $2,070,000. The estimated annual O&M cost is $206,500.

Alternative SRCV

This remedy provides short-term protectiveness by eliminating direct contact threats from landfill soil and surface materials with a RCRA cap and deed restrictions. The cap is a reliable method to prevent trespassers from the direct contact threat of landfill surface materials. The long-term risk of a release of landfill waste to the groundwater is mitigated with the cap, slurry wall, and dewatering system combination. This system serves to fully contain the landfill wastes. The possibility of containment system failure exists if highly concentrated organic solvents contact the slurry wall or underlying till and compromise the integrity of the system. A properly designed leachate collection system should, however, lessen such contact. The RCRA cap serves to significantly reduce precipitation infiltration to the landfill, ultimately reducing the potential for generation of landfill leachate. The slurry wall will fully surround landfill source materials. The wall keys into the lower permeability till layer underneath the site. The wall will prevent the possibility of upgradient groundwater from coming into contact will landfill source materials. The wall will contain liquid and solid materials inside the landfill, and the dewatering system will actively collect any liquids (leachate and liquid wastes released from drums) inside the containment system. Collected liquids will be properly treated and disposed of. The groundwater monitoring system will identify if a release outside of the containment system (in the case of failure) has occurred. Treatment of the liquids from the dewatering system, although not specified until the Remedial Design phase, will likely include some reduction of the hazardous substance toxicity, mobility, or volume. This remedy is primarily a containment remedy. Treatment is provided only to the liquids. If properly operated and maintained, this remedy will provide adequate protection of public health and the environment. There are reliability concerns about the system's ability to contain high concentrations of solvent type wastes associated with the drums. This remedy will meet the identified Federal and State ARARs for the landfill.

This remedy can be constructed in approximately twelve months. The cap and vertical barrier require some technical ability to implement and quality control is necessary for an effective action. Construction workers and equipment are available for implementation. Risks to the surrounding community during construction are negligible, and risks to construction workers are minimal since wastes remain in place. Maintenance of the cap and slurry wall should be routine. Leachate and landfill gas collection, and treatment, will be necessary over an indefinite period of time. Modifications to the remedy would be difficult, due to the complex cap and subsurface slurry wall. This remedy is not supported by the State of Michigan.

The estimated capital cost of this remedy is $8,006,000. The total present worth is $9,700,000. The estimated annual O&M cost is $250,000.

Alternative SRCVT

This remedy provides the short-term and long-term containment protectiveness as described in Alternative SRCV. In addition, the reliability and long-term effectiveness of the containment system is greatly increased because areas of concentrated drummed wastes are removed and thermally destroyed. The known complete, or a precise percentage, of drums removed will not be known, since the entire landfill will not be excavated. Drum removal reduces the likelihood of containment system failure, and reduces the stress on the leachate collection system in handling high contaminant concentrations from drum releases. This remedy provides additional treatment which significantly and permanently reduces toxicity, mobility, and volume of hazardous substances. Drummed wastes from concentrated disposal regions are destroyed offsite or onsite by incineration. These drummed wastes contain high concentrations of toxic contaminants which are relatively easily solubilized in water, therefore, mobile in the environment. A principal element of the threat at the site is treated with a permanent remedy. This remedy will provide adequate protection of public health and the environment. This remedy will meet the identified Federal and State ARARs for the landfill.

This remedy can be implemented in approximately twelve months, including a concurrent 5 month time frame for drum removal and onsite incineration or offsite transport and incineration. In addition to cap and vertical barrier installation concerns, precise definition and removal of concentrated drum areas will present some implementability issues. Drum excavation requires significant quality control. Construction workers, equipment, and offsite treatment capacity are available. Additional risk to workers beyond Alternative SCRV stems from drum excavation. Risk to the surrounding community stems from offsite transport of drummed wastes or the onsite incineration of drummed waste. Maintenance of the cap and slurry wall should be routine. Leachate and landfill gas collection and treatment should be less than that in Alternative SRCV. Modifications to the remedy would be difficult due to the complex cap and subsurface slurry wall. The State of Michigan does not support this remedy. This remedy is also not supported by the surrounding community residents. (See attached Responsiveness Summary).

The estimated capital cost of this remedy is $20,837,000. The total present worth is $22,530,000. The estimated annual O&M cost is $250,500.

Alternative RDN

This alternative provides reliable short-term protection by eliminating direct contact threats from landfill soil and source materials with an onsite RCRA landfill which will properly cover wastes. The long-term risk of a release of landfill waste to the groundwater is mitigated with a combination of drum removal and offsite or onsite incineration and disposal, and redisposal of all remaining landfill hazardous substances and contaminated soil in an onsite RCRA-type cell. The onsite landfill can be built in the previously located area of contamination, therefore, RCRA Land Ban regulations for treatment may not apply. Such containment is considered very reliable: the RCRA cap prevents precipitation percolation and leachate generation, the landfill cell contains non-drummed wastes in a double lined system with leachate collection. The leachate collection system will provide for active collection and treatment of leachate, as needed. A groundwater monitoring program will identify if a release from the containment system has occurred. This remedy provides thermal destruction treatment of all drummed waste in the landfill. This alternative utilizes treatment for destruction of toxicity, mobility, and volume of a principal element of the threat. This remedy requires some maintenance, but affords a high degree of permanence. This remedy will provide adequate protection of public health and the environment. This remedy will meet the identified Federal and State ARARs for the landfill.

This remedy can be implemented in approximately five years. This alternative requires complete waste excavation from the landfill, resulting in significant waste handling issues, and requiring considerable technical ability and quality control to assure complete waste removal. Careful design and quality control for building the onsite RCRA-type cell will be needed. Exposure risks to the workers stem from the significant waste handling and extensive waste excavation. The significant amount of waste handling extends risks to the surrounding community in addition to the risks from offsite transport of drummed wastes or onsite incineration of drummed waste. Construction workers, equipment, and treatment capacity are available. Maintenance of the RCRA-type cell should be routine and would include periodic cap replacement. Leachate and landfill gas collection and treatment will be necessary for an indefinite period of time. Leachate quantity should be less than in Alternatives SCRV and SRCVT. Modifications to the remedy would be difficult due to the engineered onsite RCRA-type cell. The State of Michigan supports this remedy. The surrounding community residents also support this remedy.

The estimated capital cost of this remedy is $28,681,000. The total present worth is $29,620,000. The estimated annual O&M cost is $102,000.

Alternative RDF

This alternative provides reliable short and long-term protectiveness by complete excavation and offsite removal of landfill wastes. All direct contact and groundwater contamination threats from the landfill are completely removed. This remedy also provides onsite or offsite thermal destruction treatment of all drummed waste in the landfill and, therefore, provides a similar degree of treatment and permanence as Alternative RDN. Long-term management of the non-drummed wastes is the responsibility of the offsite land disposal facility. This remedy will provide adequate protection of public health and the environment. This remedy will meet the identified Federal and State ARARs for the landfill.

This remedy can be implemented in approximately two years. As with Alternative RDN, this remedy requires complete excavation of landfill wastes, resulting in significant waste handling issues, and requiring considerable technical ability and quality control to assure complete waste removal. Exposure risks to the workers and surrounding community stem from the significant waste handling and extensive waste excavation. Risks to the community also exist because of the extensive offsite transport necessary for approximately 260,000 cubic yards of material. If onsite incineration is employed, there would be short-term risks from this treatment. No long-term maintenance activities are required for this remedy since the offsite disposal facility is responsible for long-term monitoring. Workers and equipment are readily available for this alternative, but the large landfill capacity needed for this volume of waste may present some difficulties. The RCRA Land Ban regulations for treatment prior to land disposal may apply, presenting potential serious implementability issues, and additional costs than configured in the FS. If no treatment is provided to wastes transported offsite for disposal, this alternative is not preferred relative to CERCLA Section 121 direction. There will likely be difficulties finding a land disposal facility in Michigan willing to accept the PBB wastes. There may also be some difficulty finding a landfill to accept the low level dioxin contaminated wastes. The State of Michigan supports this remedy.

The estimated capital cost of this remedy is $61,899,000. The total present worth is $61,920,000. The estimated annual O&M cost is $0.

Alternative RTD

This alternative provides reliable short and long-term protection with complete landfill waste excavation, onsite thermal destruction of all combustible materials in an onsite RCRA-type incinerator, onsite dewatering treatment of non-combustible materials, and disposal, as necessary, of treatment residuals and untreated materials in an onsite RCRA-type landfill. The direct contact threat and the long-term groundwater threat are mitigated. Onsite thermal treatment of all combustibles significantly destroys the toxicity, mobility, and volume of hazardous substances. This remedy provides the maximum amount of permanence, and practically eliminates the potential for future exposure. This remedy will provide adequate protection of public health and the environment. This remedy will meet the identified Federal and State ARARs for the landfill.

This remedy will take approximately 5 years to complete and will be very difficult to implement. Complete landfill excavation and waste sorting will present significant waste handling issues. Considerable technical ability and quality control will be needed to assure complete waste removal. Careful design and quality control for building the onsite RCRA-type incinerator and RCRA-type landfill will be needed. Operation of the incinerator will be lengthy and will require careful quality control and skilled operators. Equipment and specialists for onsite incinerator are available, but limited. This alternative will require careful and significant coordination with Federal, State and local authorities for environmental regulation. This alternative presents exposure risks to the workers and surrounding community during waste excavation and incinerator operation. Long-term maintenance and operation of the RCRA-type disposal cell should be routine, and less significant than the O&M in Alternatives SRCV, SRCVT, and RDN. Modifications to this remedy would be difficult. The State of Michigan has no comment on this remedy.

The estimated capital cost of this remedy is $66,364,000. Total present worth is $130,500,000. The estimated annual O&M cost is $16,742,000.

B. Landfill Evaluation Summary

1. Overall Protection of Human Health and the Environment -

The Alternatives NA, SR, and SRC do not provide adequate human health and environmental protection, therefore, are not eligible for further consideration.

Alternative SRCV is configured to provide adequate protection, but reliability concerns relative to the containment system for drummed waste materials makes the protectiveness of this alternative somewhat questionable.

All remaining alternatives provide reliable protection, although they do so through different combinations of treatment, containment, and institutional controls. The greater degree of treatment, the less reliance on containment and institutional controls.

2. Compliance with Applicable or Relevant and Appropriate Requirements -

All protective alternatives are designed to attain the applicable or relevant and appropriate requirements of other Federal and State environmental laws.

3. Long-Term Effectiveness and Permanence -

Alternative RTD offers the greatest degree of permanent management for the wastes at the site. All wastes which can be, are treated, destroying the maximum amount of hazardous substances at the site. Only wastes which cannot be treated and treatment residuals are left onsite for long-term management of waste.

Alternatives RDN and RDF provide similar degrees of permanent and long-term effective waste management. All drummed wastes are thermally destroyed, and all remaining wastes are contained in a RCRA land disposal cell which provides effective waste containment.

Alternative SRCVT provides permanent treatment for drummed wastes in concentrated disposal regions, as well as associated saturated contaminated soils. Permanent treatment for twice the volume of waste than in Alternatives RDN and RDF is proposed (4,000 drums of waste plus 4,000 drum volumes of contaminated soil). The remaining wastes are managed with a RCRA cap/slurry wall containment system. Such containment is less effective over the long-term for waste containment than a RCRA cell.

Alternative SRCV relies entirely on the RCRA cap/slurry wall containment for long-term effectiveness. Drummed wastes, which are not removed, may cause some problems for the containment system over the long-term.

4. Reduction of Toxicity, Mobility, or Volume -

Alternatives SRCVT, RDN, RDF, and RTD offer treatment which provides reduction of toxicity, mobility, and volume of hazardous substances as a principal element.

Alternative RTD offers the greatest degree of permanent and significant reduction in toxicity, mobility, and volume of the hazardous substances through treatment. Large volumes of waste (estimated at over 100,000 cubic yards) would be incinerated.

Alternative SRCVT offers thermal treatment for an estimated 8,000 drums (4,000 drums of waste plus 4,000 drum volumes of contaminated soil) or 2,000 cubic yards of material. The waste of concern in the landfill is permanently treated. Landfill leachate would also likely be permanently treated.

Alternatives RDN and RDF offer permanent treatment (incineration) for an estimated 4,000 drums or 1,000 cubic yards of material. The waste of concern in the landfill is permanently treated. Landfill leachate would also likely be permanently treated.

Alternative SRCV does not offer reduction in hazardous substance toxicity, mobility, or volume as a principal element of the remedy. Landfill leachate only would likely be permanently treated.

5. Short-Term Effectiveness -

Alternatives SRCV and SRCVT are most attractive in the short-term effectiveness respect of time to implement. Both alternatives are estimated to take one year to implement. Alternative SRCV would require no waste excavation, therefore, no short-term human health or environmental effects exist in that sense. Alternative SRCVT would require aboveground waste handling of 2,000 cubic yards of material, and would include adverse short-term effects regarding the offsite transport or onsite incineration of this waste.

Alternatives RDN, RDF, and RTD would required significant amounts of aboveground waste handling and associated adverse short-term impacts. All require complete landfill excavation (estimated to be 260,000 cubic yards of material after excavation) with some waste sorting (Alternatives RDN and RDF to sort drums) to great amounts of waste sorting (Alternative RTD to sort combustible from non-combustible materials). Alternative RDF also includes offsite transport of all wastes from the landfill (estimated at 208,000 cubic yards of waste), thus short-term effects exist from much truck traffic and some risks to the community exist during offsite transport. If drums were incinerated offsite, Alternative RDN would include short-term adverse impacts from waste transport of an estimated 1,000 cubic yards of material. If Alternatives RDN or RDF included onsite incineration, there would be short-term adverse effects from short-term operation of an onsite incinerator. Alternative RTD would include adverse short-term effects from long-term operation of the onsite incinerator.

Time to implement for Alternatives RDF, RDN, and RTD are respectively 2 years, 5 years, and 5 years.

6. Implementability -

Alternative SRCV would be the easiest to implement of all protective alternatives because it requires no aboveground waste handling and relies only on readily available materials and services. Some quality control would be required in construction. Alternative SRCVT would additionally require some landfill intrusive investigation to identify concentrated areas of drum disposal, and aboveground handling of an estimated 2,000 cubic yards of material. Services and materials for this alternative should also be readily available. There may be some difficulty identifying a compliant offsite RCRA incinerator for the 8,000 drums of material. If the drummed wastes are treated onsite, some careful quality control will be needed for building and operating the incinerator.

Alternatives RDN, RDF, and RTD require careful quality control in waste excavation and sorting. There may be some difficulty in identifying a compliant offsite RCRA incinerator for the estimated 4,000 drums in Alternatives RDN and RDF. Alterative RTD would require some quality control in building the onsite RCRA incinerator, however, materials and services should be readily available. Likewise, some quality control for the potential onsite incinerator in Alternatives RDN and RDF would be needed. There would likely be some difficulty in identifying a compliant offsite RCRA landfill disposal facility for the large amount of waste in Alternative RDF (estimated at 208,000 cubic yards of waste). Additionally identification of a land disposal facility willing to accept the PBB and low level dioxin contaminated wastes would likely be difficult. Materials and services for Alternative RTD should be available, but the long-term operation of the onsite incinerator would require significant quality control and technical skill.

7. Cost -

Alternative RTD is by far the most expensive alternative with an estimated present worth cost of $130,500,000. Alternative RDF is also clearly more expensive than the balance of protective alternatives with an estimated total present worth cost of $61,920,000.

Alternatives RDN and SRCVT are in the middle range of costs for protective alternatives, with estimated total present worth costs of $29,620,000 and $22,530,000, respectively.

Alternative SRCV is at the lower range of costs for protective alternatives, with an estimated total present worth of $9,700,000.. The cost difference between Alternatives SRCV and SRCVT is an estimated $12,830,000. This additional cost provides permanent treatment for a waste of concern at the site (drummed wastes) and long-term effectiveness for

Alternative SRCVT. It should be noted that a permanent treatment (incineration) for this waste of concern, is not available at any lesser cost.

Alternatives which do not provide adequate protection at the site have estimated total present worths of approximately $2 million and less.

8. State Acceptance -

The State of Michigan will support Alternative RDN and prefers Alternative RDF. Alternatives NA, SR, SRC, SRCV, and SRCVT are not supported by the State of Michigan.

9. Community Acceptance -

Local community residents support the above State of Michigan position. PRPs for the site support Alternative SRCV, and are opposed to Alternatives SRCVT and RDN.

II. Groundwater

A. Alternatives Evaluation

Alternative NA

No public health risks currently exist from the onsite contaminated groundwater, since there are no users of this water and migration of contaminants to offsite groundwater users is highly unlikely. However, this alternative provides no protection against future use of onsite groundwater and provides no information about the change in groundwater quality geographically and over time, and the threat this change may pose to public health and environment. This alternative provides no treatment to reduce contaminant toxicity, mobility, or volume. This remedy is not permanent. This remedy may not meet the identified Federal and State ARARs for the groundwater. There are no limitations for use of the shallow aquifer as a drinking water source, and without monitoring, compliance with the Safe Drinking Water Act MCLs is unknown. This remedy is not protective of public health and the environment.

No construction activities are associated with this remedy, therefore, there are no construction implementability issues. This remedy will take no time to implement. This remedy is not supported by the State of Michigan.

There are no costs associated with this remedy.

Alternative SR

No public health risks currently exist from onsite contaminated groundwater since there are no users of this water, and migration of the contaminants to current offsite groundwater users is highly unlikely. This alternative provides protection to future users of onsite groundwater with deed restrictions that prevent use of this water as a drinking water source. Enforcement of the deed restrictions should be implementable because the site is currently under MDNR ownership and because of the low potential for development of site property. The monitoring component of this remedy provides information about changes in groundwater quality geographically and over time. If a threat to public health and the environment is posed by changes in groundwater quality, it will be identified and a remedial action plan can be evaluated. This alternative provides no treatment to reduce contaminant toxicity, mobility, or volume other than alterations that may occur naturally through dilution, adsorption, and biological degradation.

The suspected source (lagoons) for the groundwater contamination will be completely removed in the lagoon operable unit remedial action currently in design phase. Current groundwater contaminants should eventually discharge to nearby surface water bodies, resulting in background groundwater quality in the currently affected aquifer area. If the discharge of contaminants to surface water bodies occurs in an environmentally acceptable fashion, this alternative affords a high degree of permanence for groundwater protection at the site. This remedy will meet the identified Federal and State ARARs for the groundwater at the site. This remedy is protective of public health and the environment.

Deed restrictions and installation of additional monitoring wells can be easily and quickly implemented. Equipment and workers for this remedy are easily available. Groundwater will be easy to monitor. Modifications, if necessary, could be easily implemented. This remedy is not supported by the State of Michigan.

The estimated capital cost for this remedy is $24,000. Estimated total present worth is $1,290,000. Estimated annual O&M cost is $190,000.

Alternative CTGD

The public health and environmental risks are mitigated in this alternative with groundwater collection, onsite treatment with granulated activated carbon, and discharge of the treatment effluent to Butternut Creek, such that NPDES discharge permit requirements are met. The spent carbon will eventually be disposed of offsite. This alternative uses treatment to reduce contaminant mobility and volume. This remedy will provide permanent cleanup of the groundwater by completely removing the groundwater contaminants. The reliability of this alternative is high. This alternative provides adequate protection of public health and the environment. All identified Federal and State ARARs for groundwater cleanup are met by this remedy.

This alternative is quickly and easily constructed. Some technical ability is required. Equipment and construction workers are readily available. Some administrative coordination to obtain the NPDES permit will be required. The time of system operation, until the cleanup goals are met, is estimated to be 15 years. No risks to surrounding community, and negligible risks to site workers, exist with this remedy. Modifications to this system are relatively easy. The State of Michigan supports this remedial alternative.

The estimated capital cost for this remedy is $326,000. Total present worth is $3,760,000. Estimated annual O&M costs are $465,000.

Alternative CTP

Public health and environmental risks are mitigated by this alternative with groundwater collection and offsite treatment and disposal at a Publicly Owned Treatment Works (POTW). The treatment at the POTW will significantly reduce the toxicity, mobility, and volume of groundwater contaminants. This alternative will provide permanent cleanup of groundwater by completely removing the groundwater contaminants. The reliability of this alternative is high. This alternative provides adequate protection of public health and the environment. All identified Federal and State ARARs for groundwater cleanup are met by this remedy.

This alternative is easily and quickly constructed, requiring some technical ability. Equipment and construction workers are readily available. Significant administrative coordination with State regulatory programs and the local POTW will be needed. The possibility exists that no local POTW would be willing to accept the site groundwater. The time of system operation (groundwater pumping) until cleanup goals are met is estimated to be 15 years. Risks to site workers and surrounding community exist from necessary collection and transport of water. Modifications to the treatment will be very difficult since the site waste stream is mixed with others at the POTW facility. The State of Michigan has not supported this remedial alternative.

The estimated capital cost for this remedy is $205,000. Total present worth is $2,550,000. Estimated annual O&M cost is $330,000.

B. Groundwater Evaluations Summary

1. Overall Protection of Human Health and the Environment -

Alternative NA does not afford adequate protection of human health and the environment, and is not eligible for further consideration.

The three remaining alternatives afford adequate protection, although they do so through different combinations of treatment, engineering, and institutional controls.

2. Compliance with Applicable or Relevant and Appropriate Requirements -

All protective alternatives are designed to attain the applicable or relevant and appropriate requirements of other Federal and State environmental laws.

3. Long-term Effectiveness and Permanence -

All protective groundwater alternatives are designed to assure complete groundwater cleanups in an environmentally sound fashion.

4. Reduction of Toxicity, Mobility, or Volume -

Alternatives CTGD and CTP provide for collection and the treatment of contaminated groundwater, and in that sense provide for reduction in the mobility and volume of the hazardous substances. Ultimate land disposal of the spent carbon which has collected the hazardous substances in Alternative CTGD, however, would yield no reduction in contaminant toxicity. Treatment of groundwater offsite at a POTW would offer reduction in contaminant toxicity.

5. Short-Term Effectiveness -

Alternative SR requires little/no construction and waste handling, therefore, provides the least amount of adverse short-term impacts of the protective groundwater alternatives. Alternatives CTGD and CTP both would require construction, and handling of contaminated groundwater. Alternative CTP additionally would require transport of the contaminated groundwater through the community.

6. Implementability -

Alternative SR is the easiest to implement of the protective groundwater alternatives because it requires little/no construction. Alternative CTP has potentially serious implementability issues relative to locating a local POTW willing to accept the Forest Waste groundwater.

7. Cost -

Alternatives CTGD and CTP have high range associated costs with estimated total present worths of $3,760,000 and $2,550,000, respectively. Alternative SR is the least costly protective groundwater alternative with an estimated total present worth of $1,290,000.

8. State Acceptance -

The State has supported only Alternative CTGD.

9. Community Acceptance -

No groundwater alternative was expressed as preferred by local community residents. PRPs for the site maintain no groundwater cleanup is necessary at this site.

SELECTED REMEDY AND STATUTORY DETERMINATIONS

I. Landfill Soil and Source Material

The selected remedy for landfill soil and source materials is Alternative SRCVT. This alternative is protective of human health and the environment, attains applicable or relevant and appropriate requirements promulgated under Federal and State environmental laws, and is cost-effective. Treatment which permanently and significantly reduces the volume, toxicity, and mobility of hazardous substances is a principal element of the remedy. Finally, this alternative utilizes permanent solutions to the maximum extent practicable. This alternative represents the best balance of the factors for selecting an appropriate landfill remedy at the site.

A. Protection of Human Health and the Environment

Alternative SRCVT provides protection of human health and the environment with a combination of treatment, containment, and institutional controls. Short-term protectiveness is provided with the landfill RCRA cap and deed restrictions. The cap is a reliable method to alleviate the direct contact threat from the landfill surface materials to persons entering the site. The long-term risk of release of landfill waste to the groundwater is mitigated with the cap, slurry wall, and dewatering system combination. This system serves to fully contain landfill wastes. The RCRA cap serves to significantly reduce precipitation infiltration to the landfill, ultimately reducing the potential for generation of landfill leachate. The slurry wall will fully surround landfill source material. The wall keys into the lower permeability till layer underneath the site. The wall will prevent the possibility of upgradient groundwater from coming into contact will landfill source materials. The wall will contain liquid and solid materials inside the landfill, and the dewatering system will actively collect any liquids (leachate and liquid wastes released from drums) inside the contained system. Collected liquids will be properly treated and disposed of. The groundwater monitoring system will identify if a release outside of the containment system (in the case of failure) has occurred.

In addition, removal and treatment of concentrated areas of drummed waste will ensure the reliability of the containment system and provide significact long-term effectiveness.

The short-term impact of limited landfill excavation and onsite construction are manageable and can be reasonably accomplished in an environmentally sound fashion. Likewise, the offsite transport or onsite incineration of the estimated 2,000 cubic yards of material present manageable short-term impacts.

B. Attainment of Applicable or Relevant and Appropriate Requirements (ARAR)

Alternative SRCVT will meet all ARARs of Federal, and more stringent State environmental laws. See discussion below.

C. Cost-Effectiveness

This alternative affords a high degree of effectiveness by providing protection against direct contact threats and a threat of releases to the groundwater. The containment portion of this remedy will be reliable in the long-term, as concentrated areas of wastes, which may compromise the containment system if left in place, are removed and permanently treated. Although Alternative SRCV provides identical containment of landfill wastes and has an estimated total present worth of $9,700,000, Alternative SRCVT with an estimated total present worth of $22,530,000 is the cost-effective alternative. Potential future costs with Alternative SRCV are likely if concentrated drummed wastes cause containment failure. The additional cost of Alternative SRCVT provides permanent treatment of drummed waste insuring the integrity of the containment system. This degree of treatment cannot be gained for any lesser costs. The wastes of most concern in the landfill, due to their toxic, mobile nature, are treated.

Alternative NA, SR, and SRC are less costly than Atlernative SRCVT, however, none of them provide adequate public health and environmental protection. Future costs are likely with all of these remedies. None of these remedies provide a cost-effective solution to the problem.

Alternative RDN provides treatment similar to Alternative SRCVT. Less waste is treated in Alternative RDN since saturated soils are not treated but complete landfill excavation insures locating and removing all drums. The containment system is more secure, and the estimated total present worth ($29,620,000) is a higher cost than Alternative SRCVT. Short-term impacts and implementability issues are, however, greater than Alternative SRCVT. The greater cost is due primarily to more sophisticated containment. The containment, however, is for less mobile wastes, since drummed wastes are removed. The additional long-term benefits gained in Alternative RDN are not commensurate with the additional cost for this remedy.

Alternatives RDF and RTD require significantly greater costs (estimated total present worths of $61,920,000 and $130,500,000, respectively) and significantly greater implementability issues than Alternative SRCVT, without commensurate gains in overall effectiveness.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Alternative SRCVT focuses on providing permanent and significant treatment of the wastes of concern (drummed wastes) at the site. Identification, excavation, and treatment of these wastes can be practicably done. The volume of waste to be handled is relatively small- 2,000 cubic yards. Alternatives which provide greater degrees of permanence present significant waste handling and implementability issues which render such alternatives not practicable. All of the more permanent remedies require complete landfill excavation and above-ground management of approximately 260,000 cubic yards of waste. Time frames associated with more permanent alternatives are 2 to 5 years, as compared with Alternative SRCVT, which is estimted to take one year to implement. Alternatives which do not provide source treatment (Alternatives NA, SR, SRC, SRCV) afford little permanence.

No alternative is widely accepted by all parties involved in the site. The State and local community, as well as the PRPs oppose Alternative SRCVT. Their issues with the selected alternative are very different (see

Responsiveness Summary). Such lack of support presents implementability issues for this alternative.

E. Preference for Treatment as a Principal Element

Concentrated areas of wastes of concern in the landfill are permanently treated (incinerated) to reduce the toxicity, mobility, and volume of the hazardous substances. The preference for treatment as a principal element is met with Alternative SRCVT.

2. Groundwater

The recommended remedy for selection and implementation for the groundwater is Alternative SR. This alternative is protective of human health and the environment, attains Federal and State requirements promulgated under environmental laws that are applicable or relevant and appropriate, and is cost-effective. Treatment solutions which permanently and significantly reduce toxicity, mobility, and volume of hazardous substances are not a principal element of of this groundwater remedy. This alternative does provide a permanent solution to the groundwater contamination. This alternative represents the best balance among the factors for selecting an appropriate groundwater remedy at the site.

A. Protection of Human Health and the Environment

No public health risks currently exist from onsite contaminated groundwater since there are no current users of this water, and migration of the contaminants to current offsite groundwater users is highly unlikely. This alternative provides protection to future users of onsite groundwater with deed restrictions that prevent use of this water as a drinking water source. The monitoring component of this remedy provides information about changes in groundwater quality geographically and over time. If a threat to public health and the environment is posed by changes in groundwater quality, it will be identified and a remedial action plan will be evaluated. Modelling information has indicated that a current onsite contamination will discharge to offsite groundwater at concentrations that are well within all remedial action goals.

The suspected source (lagoons) for the groundwater contamiantion will be completely removed in the lagoon operable unit remedial action currently in design phase. Current groundwater contaminants should eventually discharge to nearby surface water bodies, in an environmentally sound fashion resulting in background groundwater quality in the currently affected onsite aquifer area.

The monitoring component of this remedy will include quarterly sampling and analysis of groundwater during the first 5 years. The program would then be reevaluated to determine if changes in analyses and sampling frequency are necessary. Samples will be analyzed for CLP organic and inorganic parameters and for conventional parameters such as chloride, sulfate, nitrate, nitrite, specific conductivity, and alkalinity.

Annually, the quarterly results of the sampling and analysis program will be averaged and compared to the groundwater remedial action goals. At the site boundary (monitoring well nos. MW85-1S and MW85-2S), if on an average annual basis, the quality of groundwater is greater than MCLs, exceeding lifetime health advisories, exceeding levels for noncarcinogenic health effect protection (based on reference doses) or exceeding a lifetime cancer risk range of 10^{-4} to 10^{-7}; or offsite, upgradient of the wetlands, (monitoring well nos. MW86-4S, MW86-3S, and MW86-2S) if on an average annual basis the quality of the groundwater is greater than Federal Ambient Water Quality Criteria or State of Michigan Surface Water Quality Guideline Levels for the Protection of Aquatic Life, a plan for further groundwater remedial action will be evaluated.

The minimal construction and operations of this alternative present no adverse short-term impacts.

B. Attainment of Applicable or Relevant and Appropriate Requirements

Alternative SR will meet all ARARs of Federal, and more stringent State environmental laws. See discussion below.

C. Cost-Effectiveness

This alternative affords a high degree of effectiveness by providing protection against use of onsite groundwater with deed restriction and assuring the contaminants discharge to offsite areas in an environmentally sound fashion, (ie., consistent with the groundwater remedial actions goals) with the monitoring program. The estimated total present worth cost of $1,290,000 is on the low range of the alternatives developed in the FS. The no action alternative, with a total present worth of $0, is not acceptable as a cost-effective alternative because it does not provide adequate public health and environmental protection.

Alternatives CTGD and CTD include active construction and waste handling, and have respective estimated total present worth costs of $3,760,000 and $2,550,000. The additional adverse short-term impacts of waste handling, and additional costs associated with these alternatives are not necessary to provide public health and environmental protection. These alternatives are not cost-effective.

D. Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

Alterntaive SR provides a permanent solution to the onsite contaminated groundwater problem. Over time, through dilution and adsorption, the minimally contaminated onsite groundwater should reach background levels as the contaminants discharge to the nearest surface water body in an environmentally sound fashion. Since the source of this groundwater contamination (lagoons) is being completely removed in the lagoon operable remedy, no future contribution to this contaminant plume will occur.

Alternatives CTGD and CTP also provide permanent remedies, and do so through treatment processes. The actual amount of hazardous substances treated in these remedies, however, is very small. These remedies also present implementability issues and adverse short-term impacts. The additional cost and implementability issues, with no gain in overall protectiveness or permanence, make selection of these alternatives not practicable.

E. Preference for Treatment as a Principal Element

The groundwater Alternative SR does not use treatment as a principal element. Use of treatment provides no gain in overall protectiveness or permanence for the groundwater cleanup, therefore, is not worthwhile. The overall site remedy, including the landfill cleanup, however, does provide treatment as a principal element.

State Issues

The landfill soil and source materials, and groundwater operable unit recommended alternatives are both opposed by the State of Michigan. The protection provided by landfill operable unit Alternative SRCVT is not viewed by the State as adequate. The groundwater Alternative SR is not acceptable to the State. The State maintains that the releases to the onsite groundwater merit active groundwater cleanup. The State of Michigan position and the U.S. EPA response is discussed in detail in the Responsiveness Summary.

ATTAINMENT OF APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS OF ENVIRONMENTAL LAWS

1. Landfill Soil and Source Materials ARARs

Alternative SRCVT is designed to meet all applicable, or relevant and appropriate requirements (ARARs) of Federal, and more stringent, State environmental laws. The Federal ARARs include the Resource Conservation and Recovery Act (RCRA) (42 USCA Section 6901 *et seq* and 40 CFR Part 260-271), the Clean Water Act (40 CFR Parts 122, 125, and 131), the Safe Drinking Water Act (42 USCA Section 300(f) *et seq* and 40 CFR Part 141), the Clean Air Act (42 USCA Section 7401 *et seq* and 40 CFR Parts 50 and 61), and the Occupational Safety and Health Administration Act (40 CFR 1910). Potential State ARARs include the Michigan Hazardous Waste Management Act (Act 64), the Liquid Industrial Waste Removal Act (Act 136), the Air Pollution Act (Act 347), the Mineral Well Act (Act 315), and the Water Resources Commission Act (Act 245).

A. Federal Resource Conservation and Recovery Act

RCRA regulations will be applicable to the waste removed from the landfill for incineration treatment. All such material will be considered to be hazardous waste as defined in the RCRA regulations, 40 CFR Part 261 "Identification and Listing of Hazardous Wastes", unless proven otherwise, or unless the waste is regulated by another statute such as the Toxic Substances Control Act.

After removal and treatment/disposal of drum wastes and contaminated soils, the FWD landfill area will be closed. Because disposal of hazardous waste at the FWD landfill occured prior to the effective date of the RCRA regulation, the RCRA closure regulations are not applicable. However, they are considered relevant and appropriate. The relevant and appropriate requirements of RCRA Subtitle C regulations, will be met by the selected remedy.

RCRA closure and post-closure requirements for all hazardous waste management facilities are outlined in 40 CFR Subpart G. Section 264.310 of RCRA Subpart N specifies the performance-based requirements for a cover at final landfill closure. The cover system in Alternative SRCVT will be a cap as prescribed in RCRA guidance and will comply with RCRA regulations. The cap will minimize migration of liquid through the landfill, function with minimum maintenance, promote drainage, minimize erosion, accommodate settling, and be less than or equal to the permeability of natural subsoils present.

After closure is completed, the substantive monitoring and maintenance post-closure requirements contained in Section 264.117 through 264.120 of Subpart G will be conducted. The facility will be closed according to the standards in Subpart G Section 264.111 - Closure performance standards. After the closure activities have concluded, a survey plat, as prescribed in Subpart G Section 264.116, indicating the location and dimensions of the disposal area will be submitted to the local zoning authority, or to the authority with jurisdiction over local land use, and the Regional Administrator (Michigan State Director).

The drum wastes and contaminated soils removed from concentrated regions of the landfill prior to closure must be properly disposed of or decontaminated as required in Subpart G Section 264.114. If incinerated offsite these wastes will be staged and repackaged onsite, and transported offsite for incineration at a RCRA treatment facility operating in compliance with 40 CFR Sections 264.340 through 264.351. The excavated waste will also be handled as regulated by Part 262 - Standards Applicable to Generators of Hazardous Waste, and Part 263 - Standards Applicable to Transporters of Hazardous Waste. If incineration is onsite, it must operate in compliance with the technical requirements of Subpart O Sections 264.340 through 264.351.

B. Michigan Hazardous Waste Management Act (Act 64)

To the extent that Act 64 is more stringent than the Federal RCRA regulation, Act 64 will be followed.

Rules 301(4) and 304 (1) (c) of Act 64 require that a generator use a licensed transporter or generator-owned licensed vehicle for transport of hazardous waste offsite.

Regarding manifesting, a Michigan Department of Natural Resources manifest will be used and mailed to MDNR as outlined in Rule 304. Rules regarding use of the hazardous waste number will be followed as outlined in Rule 304(2), 305(1)(e), and 306.

Wastes accumulated onsite for less than 90 days must be stored in containers with secondary containment equivalent to that of a permitted facility under 40 CFR 264.175. Containers must be labeled with the hazardous waste number.

The following rules for transporter standards will apply under Act 64: requirements for transporter business and vehicle licenses (Rule 403 and 406), use of Michigan manifest form (Rule 409(1)) and liability insurance (Rule 711).

Transporters must comply with generator requirements when they mix small quantities (Rule 401(3) and 405 (2)). Mixing, combining, and commingling of managed hazardous waste (greater than 1000 kg) is prohibited without approval from the MDNR.

The following transporter vehicle requirements will be followed: Rule 406 vehicle labeling, operation and maintenance requirements, and identification numbers; compliance with Act 300 Michigan Vehicle Code; Act 207 Fire Prevention Act; Act 181 Motor Carrier Safety Act; and the Hazardous Material Transport Act (Rule 408 (1)), and Rule 408 Provisions for a Fire Marshall Inspection.

Rule 410 of Act 64 outlines the procedures to be followed in the event of waste discharge during transport.

Rule 409(2) requires transporters to document communications with generators on the manifest, if waste cannot be delivered.

Relative to landfill closure provisions, Act 64 Rule 619 specifies closure standards, including a minimum cover requirement, and requirements for venting which will be followed.

C. Michigan Liquid Industrial Waste Removal Act (Act 136)

This Act requires the use of a licensed liquid industrial waste hauler to remove any industrial liquid wastes offsite, similar to the requirements of RCRA Part 263. To the extent these requirements are more stringent than RCRA, they will be complied with for handling offsite disposal of liquid waste from the landfill.

D. Federal Clean Air Act

The Clean Air Act (CAA) identifies and regulates pollutants that could be released during earth-moving activities associated with the partial excavation and slurry wall construction and potential onsite incineration of SRCVT. The CAA Section 109 outlines the criteria pollutants for which National Ambient Air Quality Standards have been established. CAA Section

112 identifies pollutants for which there are no applicable Ambient Air Quality Standards, those substances regulated under the Federal National Emission Standards for Hazardous Pollutants. The CAA is an ARAR and the regulations standards will be complied with during implementation of SRCVT.

E. Michigan Air Pollution Act (Act 348)

Under this Act, the Michigan Air Quality Division, through Rule 901, exercises its authority to ensure that a person does not cause or permit the emission of an air contaminant in quantities that will cause, "injurious effects to human health or safety, animal life, plant life or significant economic value" or "unreasonable interference with the comfortable enjoyment of life and property." This Act is an ARAR which has more stringent emissions controls for air contaminants than the Federal Clean Air Act, and the substantive technical requirements will be complied with during landfill excavation and potential onsite incineration.

F. Federal Occupational Safety and Health Administration Act (OSHA)

The selected remedial action contractor must develop and implement a health and safety program for his workers, if such a program does not already exist. All on site workers must meet the minimum training and medical monitoring requirements outlined in 40 CFR 1910. OSHA will also be complied with when implementing the groundwater remedial activity.

2. Groundwater/Surface Water ARARs

Alternative SR is designed to meet all applicable, or relevant and appropriate requirements of Federal, and more stringent, State environmental laws. Three groups of Federal environmental standards and criteria are considered ARARs for the groundwater at the FWD site: Safe Drinking Water Act Maximum Contaminant Limits (MCLs), RCRA Groundwater Protection Standards, and Clean Water Act Ambient Water Quality Criteria. These are ARARs for groundwater protection underneath the landfill for the landfill operable unit remedy, as well as for the affected groundwater in the groundwater operable unit remedy. The CWA regulation is likewise an ARAR for protection of surface water relative to the landfill and groundwater operable unit remedies.

Potential State ARARs for the regulation of groundwater at the site include the Michigan Water Resources Commission Act and the Mineral Well Act. Michigan environmental law regulating surface water includes the Michigan Water Resources Commission Act.

A. Federal Groundwater ARARs

Maximum Contaminant Levels established under the Safe Drinking Water Act are ARARS at this site. MCLs are the maximum contaminant concentrations allowed in a regulated public water supply. These levels apply at the point of distribution ("at the tap") to public water systems having at least 15 service connections or regularly serving at least 25 individuals.

Levels are based on a chemicals toxicity, treatability (including cost considerations), and analytical limits of detection.

MCLs are relevant and appropriate at FWD for groundwater protection because the aquifers underneath the site are defined as drinking water aquifers, and MCLs are the enforceable drinking water standard for public water supplies. Since MCLs apply to water at the point of use, these levels are appropriate for establishing water quality in the drinking water aquifers at the site. Groundwater tapped for drinking water generally has minimal or no treatment. These standards will be applied to the groundwater itself to ensure safe levels in the groundwater underneath the site.

The groundwater cleanup levels are also consistent with Maximum Concentrations Limits or health based Alternate Concentration Limits under RCRA Subpart F. Specifically, the protection provided for groundwater in the site remedies is consistent with RCRA Subpart F Section 264.100. Corrective action program, which serves as the ARAR. The point of compliance for groundwater protection is established onsite. For the groundwater plume to the east, the point of compliance is at monitoring well Nos. MW85-1S and MW85-2S. For the landfill, the point of compliance is at the physical landfill perimeter.

B. Federal Surface Water ARAR - Ambient Water Quality Criteria (AWQC) established under the Clean Water Act (CWA)

The CWA is an ARAR at this site since site groundwater eventually discharges to the surface water body (wetlands) east of the site. The AWQC are established for protection of freshwater aquatic organisms. AWQC will be met at the point the groundwater discharges to the closest surface water body. Monitoring shallow groundwater, upgradient at the surface water body, will assure compliance with AWQC before it discharges to the wetlands.

C. Potential State Groundwater ARARs

i. Water Resources Commission Act (Act 245)

Act 245 is not a groundwater ARAR at this site. Its purpose is to prevent discharges into the groundwater. U.S. EPA is not discharging into the groundwater, hence the Act is not applicable.

Similarly, Act 245 is not relevant or appropriate to establishing cleanup levels at the site. There are no promulgated regulations U.S. EPA can consider in setting cleanup standards. Additionally, the objectives of the Act and rules, which are to define and limit discharges, vary significantly from U.S. EPA's objectives to cleanup the site.

ii. Mineral Well Act (Act 315)

Act 315 and the Administrative Rules require that test wells be permitted, constructed properly, recorded, and properly plugged upon abandonment. This Act is an ARAR and treatment of all test wells will be dictated by it.

State Surface Water ARAR - Water Resources Commission Act (Act 245)

Act 245 establishes surface water standards. The more stringent promulgated State standards, relative to the CWA AWQC, will be met for any discharges to the nearest surface water discharge point.

Summary Discussion

Considering the various evaluation factors in SARA Section 121 (b) and the National Contingency Plan, Alternative SRCVT for the landfill and Alternative SR for the groundwater offer cost-effective solutions to the contaminant problems onsite. Both remedies satisfy Federal and State ARARs.

Alternative SRCVT provides adequate protection of human health and the environment, and utilizes treatment, which permanently and significantly reduces toxicity, mobility, and volume of hazardous substances, as a principal element. This alternative utilizes long-term onsite management of some wastes in a reasonable fashion, and presents no major engineering implementability issues.

Alternative SR provides adequate protection of human health and the environment. The minimal groundwater contamination problem is handled with a deed restriction/monitoring alternative which incurs little cost and is easily implemented.

OPERATION AND MAINTENANCE

The recommended landfill Alternative SCRVT requires some annual operation and maintenance (O&M). Maintenance of the landfill cap and slurry wall will be required periodically over time. Operation of a collection and treatment system for landfill leachate and gas will be needed over time. Maintenance of a site fence will be needed. Operation of a groundwater monitoring program to identify potential groundwater releases from the slurry wall/cap containment system will be required over time.

The recommended groundwater remedy, Alternative SR, will require operation of a groundwater sampling and analysis monitoring program. Over time it is anticipated that the monitoring program can be abandoned as groundwater contamination attenuates and is no longer detected, due to dilution and adsorption.

FOREST WASTE DISPOSAL
OTISVILLE, MICHIGAN

RESPONSIVENESS SUMMARY

INTRODUCTION

The United States Environmental Protection Agency (U.S. EPA), with the Michigan Department of Natural Resources (MDNR), has completed a Remedial Investigation and Feasibility Study (RI/FS) regarding the Forest Waste Disposal (FWD) site located at 8359 East Farrand Road, Otisville, Michigan. During the RI/FS, information was collected on the nature and extent of contamination at FWD (RI), and alternatives for appropriate remedial action at FWD were developed and evaluated (FS). Throughout this process, several public meetings have been held near the site in which U.S. EPA and MDNR discussed the RI/FS progress and exchanged information with the public. At the conclusion of the FS, a Proposed Plan was finalized by U.S. EPA, after discussion with MDNR, which identified recommended alternatives for remedial action at the FWD site. U.S. EPA recently held a public comment period from January 29, 1988, to February 27, 1988, for interested parties to comment on U.S. EPA's Proposed Plan and Feasibility Study for addressing contamination problems at the Forest Waste Disposal Site. At a public meeting on February 17, 1988, U.S. EPA presented its Proposed Plan for the Forest Waste Disposal site.

The purpose of this Responsiveness Summary is to document the comments received during the public comment period, and U.S. EPA's responses to the comments. All of the comments summarized in this document were considered prior to U.S. EPA's final decision.

The responsiveness summary is divided into the following sections:

I. Responsiveness Summary Overview. This section briefly outlines the proposed remedial alternatives as presented in the Feasibility Study (FS), including the recommended alternative.

II. Background on Community Involvement. This section provides a brief history of community interest and of concerns raised during planning activities at the site.

III. Summary of Public Comments Received During Public Comment Period and U.S. EPA Responses. Both oral and written comments are grouped by issues, followed by U.S. EPA responses to these comments.

I. OVERVIEW

On January 29, 1988, U.S. EPA made available to the public for review and comment the Public Comment Draft Feasibility Study (FS) report for the Forest Waste Disposal Site. In the FS report, methods for cleaning up the landfill soil and source materials, and the groundwater on the east end of the site were developed and evaluated. Eight alternatives to address the landfill soil and source materials, and four alternatives to address the groundwater were presented. The proposed remedial alternatives include the following:

Landfill Soil and Source Materials

1. Alternative NA - No Action.
This alternative assumes that no further corrective actions take place at the site and that no restrictions are placed on future use at the site. This alternative is primarily included as a baseline scenario to which other alternatives can be compared.

2. Alternative SR -
Site access restrictions, fence, and groundwater monitoring.

3. Alternative SRC -
Site access restrictions, fence, groundwater monitoring, and soil cover.

4. Alternative SRCV -
Site access restrictions, fence, groundwater monitoring, RCRA impermeable cap, slurry wall vertical barrier, and landfill dewatering and treatment.

5. Alternative SRCVT -
Site access restrictions, fence, groundwater monitoring, limited landfill drum excavation and offsite incineration, RCRA impermeable cap slurry wall vertical barrier, and landfill dewatering and treatment.

6. Alternative RDN -
Complete landfill waste excavation, offsite incineration of all drums, build onsite RCRA-type hazardous waste landfill, redisposal of remaining landfill wastes in onsite landfill, RCRA impermeable cap, and groundwater monitoring.

7. Alternative RDF -
Complete landfill waste excavation, and complete offsite waste disposal at a RCRA hazardous waste disposal facility.

8. Alternative RTD -
Complete landfill waste excavation, treatment of all combustible wastes in an onsite RCRA-type incinerator, dewatering of the non-combustible waste onsite, build onsite RCRA-type hazardous waste landfill, redisposal of treatment residuals and untreated wastes in onsite landfill, RCRA impermeable cap, and groundwater monitoring.

Groundwater

1. Alternative NA -
No action. This alternative is as described above.

2. Alternative SR -
Site restrictions and groundwater monitoring.

Collection of contaminated groundwater, treatment of water onsite with granulated activated carbon, and discharge of treated water to Butternut Creek.

4. Alternative CTP -
Collection of contaminated groundwater, and transport and offsite treatment of groundwater at a Publicly Owned Treatment Works (POTW).

After careful evaluation, U.S. EPA selected Alternative SRCVT for the landfill soil and source materials and Alternative SR for the groundwater.

Numerous parties submitted formal written comments to U.S. EPA during the public comment period. Those parties include:

1) Numerous area residents (approximately 75)
2) Michigan Department of Natural Resources
3) Michigan State Congressional Representative Nate Yonkers
4) Michigan Department of Public Health
5) Mr. Ronald Willson, resident of Owosso, Michigan
6) Forest Waste Coordinating Committee representing the Potentially Responsible Parties (PRP)
7) U.S. Fish and Wildlife Service

One area resident also submitted a verbal comment over the telephone during public comment period. Formal comments were also submitted at the public meeting by Mr. Wayne Desjarlais, Mr. Michael Borges, Mr. Gary Palmer, State Representative Nate Yonkers, and Ms. Diane Roulette.

II. BACKGROUND ON COMMUNITY INVOLVEMENT at the Forest Waste Disposal Site.

The planning process for the RI at the Forest Waste Disposal Site began in Winter, 1983. The Michigan Remedial Action Program Community Involvement strategy was applied to this site. The State of Michigan has had the lead role for site Community Relations. A site specific Community Relations Plan (CRP) was formed in Winter, 1983.

Also in Winter 1983 a Citizens Information Committee (CIC) was formed. The CIC is a group of local citizens and State, County, and local officials with high interest in site activities. The U.S. EPA participates in CIC meetings. The CIC serves as a liaison between the U.S. EPA and local citizens, to keep local citizens advised of Superfund activities at the site. The CIC has held meetings periodically.

A mailing list of all interested persons was completed early in the RI, compiled from names provided by the CIC and attendance lists at public meetings. To date, nine progress reports have been developed and distributed to the community. The mailing list includes approximately 200 surrounding residents. The progress reports summarize site activities, findings, and future plans.

Five open public meetings have been held to present and explain site activities to the community and receive community response to these activities.

The first public meeting was held in May, 1984, at the start of the RI/FS, to explain the Superfund program and the scope of the RI/FS. There were approximately 50 attendees at the meeting. Community concerns expressed at that time included testing of residential drinking wells and private ponds, and the past role of the Genesee County Health Department and MDNR in regulating the site. Initial RI work included collecting water samples from private ponds of surrounding residents. MDNR also collected a composite fish sample from a private pond adjacent to the site.

The second public meeting was held May 16, 1985, (100 attendees plus local press) and served to provide an update for citizens on the status of the RI/FS. The community expressed concern about the seemingly slow progress towards cleanup at the site. The community also expressed concerns about testing of their drinking wells. In Summer 1985, drinking water from several residents wells surrounding the site was sampled. No evidence of contamination was found.

The third public meeting was held April 21, 1986, and included approximately 40 attendees. This meeting was held to present to the public the findings of the Phased Feasibility Study (PFS) which developed and evaluated remedial action alternatives for cleanup of the site lagoons. The U.S. EPA recommended alternative for complete offsite disposal of lagoon waste was well received by the local citizens. Some citizens expressed concerns at that meeting that they had been dealt with unfairly in the past. The U.S. EPA recommended alternative was selected, as documented in the June 30, 1986, Record of Decision.

The fourth public meeting was held October 1, 1987. Approximately 50 people attended. U.S. EPA and MDNR presented to the public the findings of the final RI Report. At that meeting, the public was also informed of the upcoming FS process of developing and evaluating remedial alternatives for complete site cleanup.

A brief outline of final site remedial action alternatives under consideration at that time was presented to the public. The public was requested to submit comments on the outline at either the meeting or later. Only one comment was received on the outline. This comment was relative to a proposed final groundwater cleanup alternative to collect contaminated groundwater and discharge it to Butternut Creek without treatment. A verbal comment was made at the meeting that such a transfer of contaminated groundwater did not make sense. The PRPs had representatives at the public meeting.

At this meeting a schedule for the selected lagoon cleanup was also presented. The public expressed interest in seeing action taken at the lagoons in a timely fashion.

The final Public Comment Draft Feasibility Study (FS) was released on January 29, 1988. At a public meeting on February 17, 1988, U.S. EPA summarized the findings of the FS and presented its Proposed Plan of recommended cleanup actions. Representatives from MDNR presented the State position that the U.S. EPA proposed alternatives do not provide enough cleanup action at the site, and presented their preferred alternatives of Alternative RDN for the landfill soil and source materials, and Alternative SR for the contaminated shallow groundwater at the site.

The community response at the public meeting focused heavily on the lack of action at the site lagoons and the long timeframes associated with complete site cleanup. Community residents were notably upset and emotional about such lack of action. Comments made by meeting attendees on the final FS presentation supported the MDNR recommended alternative for the landfill. The community also expressed concerns about implementing a site cleanup alternative if the U.S. EPA and MDNR could not come to an agreement on degree of cleanup. Specific responses to comments made are presented in Section III of this Responsiveness Summary.

III. SUMMARY TO COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND U.S. EPA'S RESPONSE TO COMMENTS.

Comments raised during the Forest Waste Disposal Feasibility Study public comment period are summarized below. A number of comments were submitted during the public comment period which are not relevant to the selection of remedy and are not comments, criticisms, or new data regarding the proposed plan or proposed findings under Section 121(d)(4) of CERCLA. Therefore, per Section 117(b), it is not appropriate to respond to such comments in the Final Plan or Record of Decision. Such comments will, however, be addressed through an appropriate communication medium.

Three general categories of comments were submitted during the public comment period. These include:

1) Comments that the U.S. EPA recommended remedy is inappropriate because it provides too much protection,
2) Comments that the U.S. EPA recommended remedy is inappropriate because it does not provide enough protection, and
3) Comments that the U.S. EPA recommended remedy is appropriate.

Comments are organized and paraphrased in order to effectively summarize and respond to them in this document. The reader is referred to the actual reports and comments in the Administrative Record.

I. Comments from Potentially Responsible Party (PRP) Representatives - Forest Waste Coordinating Committee (FWCC)

Comments submitted by the PRPs argue that the U.S. EPA preferred landfill alternative, Alternative SRCVT, is inappropiate because it goes beyond actions necessary to adequately protect human health and the environment.

The PRPs directed their comments toward the U.S. EPA and MDNR recommended alternatives. U.S. EPA will not respond to comments characterizing the MDNR alternative as the recommended alternative because it is not the U.S. EPA recommended alternative.

I.A. Comment

The U.S. EPA ignored the results of the risk assessment process. The U.S. EPA has failed to base remedial decisions on the statutorily mandated requirements of risk and cost effectiveness.

1. The risk assessment process is mandated by SARA. Under SARA Section 105(a)(8)(A) and the NCP, the U.S. EPA must perform a formal Endangerment Assessment to assess the risk posed at a Superfund site before identifying and selecting the appropriate final remedial alternative.

2. The U.S. EPA and PRP FWCC concluded that the Forest Waste Disposal site poses minimal immediate or future threat to the environment and to nearby residents, and there are extensive clay deposits underlying the site that provide an excellent natural containment. Both groups concluded that even an unremediated site would pose little future risk.

3. The U.S. EPA's formal Endangerment Assessment concluded that there is no likely risk of contamination reaching the residential wells in the neighborhood because there is no direct pathway. U.S. EPA has acknowledged that no groundwater contaminants have been detected coming from the landfill area and no residential wells have been affected by the site. The U.S. EPA Fact Sheet acknowledged that most private wells draw water from aquifer below the shallow surface aquifer shown to be contaminated. Existing local wells are not thought to be in jeopardy of being impacted by groundwater contamination detected east of the lagoons.

4. The U.S. EPA Endangerment Assessment concluded that the only present risk from the site was caused by direct ingestion of contaminated surface soils in the landfill area, and that a potential future risk existed with respect to the shallow aquifer, assuming no remediation of the landfill took place. This analysis ignored that the shallow aquifer is not being used to supply residential wells downgradient of the landfill and lagoon area. The U.S. EPA Fact Sheet acknowledged that both onsite soils and the groundwater have documented contamination and this contamination poses little immediate threat to the public.

5. The U.S. EPA fact sheet acknowledged that the most significant current risk for exposure to contaminants is the risk of direct exposure to waste

materials from trespassers coming onto the site. Because of this, the entire site was fenced earlier.

6. An MDNR representative indicated that the formal Agency Endangerment Assessment would not necessarily be the basis for selecting a remedy for the site, and that other factors would be considered.

I.A. Response

The U.S. EPA Baseline Risk Assessment in Chapter 6 of the RI (August 1987) and the PRP Endangerment Assessment (EA) performed by Life Systems (October 1987) are both in the Administrative Record (AR) for final remedy selection at the Forest Waste site. Both have been carefully reviewed and considered by U.S. EPA in final remedy selection. The quantitative methods and conclusions in both these studies are similar.

Both of these studies evaluated the potential hazards to public health and the environment using current site data under the No Action alternative, which assumes no corrective actions take place and no restrictions are placed on future use of the site. This evaluation was done as directed in the U.S. EPA Superfund Public Health Evaluation Manual (1986), and presents an evaluation of the No Action alternative as required under Section 300.68(f)(1)(V) of the NCP.

In evaluating the No Action alternative, both studies evaluated the use of onsite contaminated shallow aquifer as a future drinking water supply. This is appropriate because the shallow aquifer, if unaffected by site contaminants, would be of sufficient quality and quantity to be a drinking water supply. U.S. EPA recognizes that the current shallow groundwater contamination appears to be from the lagoons, and not the landfill. U.S. EPA considers this aquifer to be a drinking water aquifer.

This risk assessment analysis did not ignore that the aquifer is currently not being used to supply downgradient residential wells. U.S. EPA acknowledges that most private wells in the area draw water from below the shallow contaminated aquifer. However, in evaluating the No Action alternative, an assessment of the risk of using of this groundwater is appropriate. It is significant to note that the commentors (PRPs) performed the same type of No Action assessment in their EA. In addition, consistent with U.S. EPA Groundwater Protection Strategy (August 1984), the shallow groundwater at the site should be protected for its highest beneficial use. In this case, that highest beneficial use is as a drinking water source.

Both the U.S. EPA and PRP EAs, utilizing current groundwater contamination to date, concluded that under a future residential land use scenario, the shallow aquifer groundwater would present potential human health concerns. Under the same exposure scenario, both studies also concluded that human contact with landfill soils would present human health concerns.

Both EA studies identified that under current land use conditions of occasional trespassing, no human health risk due to currently contaminated groundwater exists. Current groundwater contamination is limited to onsite areas, and there are no drinking water wells onsite. Both the U.S. EPA (Appendix C of FS) and the PRPs (EA) modelled current groundwater contamination, concluding that migration of the present degree of contamination will not present risks to surrounding surface water bodies or current residential wells.

The primary difference in conclusions between U.S. EPA's EA and the PRPs' EA, is that U.S. EPA identifies the landfill as an area of concern under a current land use trespass setting due to soil and source materials on the landfill surface. The U.S. EPA is concerned about a soil sample with lead concentration which, under a trespass exposure setting, exceeds the lead reference dose for chronic exposure. The PRP EA did not identify the lead contaminated soil of concern because lead does not have an acceptable subchronic intake value. Since current land use conditions at the site are those of trespass, the PRP position apparently is that an evaluation for lead cannot be done because the trespass scenario is a subchronic exposure scenario. The PRPs apparently believe that evaluation of lead potential effects in a trespass scenario cannot be gained with a comparison to chronic reference doses as done by U.S. EPA. U.S. EPA maintains that its evaluation is useful.

More importantly, U.S. EPA identifies the landfill as an area of concern under current land use conditions due to hazardous waste source materials on the surface. Data from the landfill test pit investigation indicate that exposed drums on the landfill surface contain hazardous substances that could result in a direct and acute exposure threat through dermal absorption or incidental ingestion (page A-5 of U.S. EPA FS).

U.S. EPA maintains that currently the Forest Waste site poses minimal risk to the surrounding community. The most significant risk is from trespassing on the site landfill which could lead to ingestion or dermal absorption of hazardous substances. The entire site is fenced to discourage such trespassing. Currently, offsite releases and risks from the site are minimal. However, U.S. EPA does not feel that an unremediated site would pose little future risk.

U.S. EPA evaluation of risk at the site extends beyond that done by the PRPs in their EA. The U.S. EPA recognizes that the nature of waste disposal in the landfill, and the types of wastes in the landfill, present a risk for future releases (pages 6-34 and 6-35 of the FS) of contamination to the environment. The quantitative evaluations done in the U.S. EPA and PRP EA were based on current releases of contaminants to the environment. Future releases also present future risks from the site, especially relative to the drummed wastes in the landfill.

The U.S. EPA FS, on pages A-5 and A-6, crudely models a future release of contaminants from drummed landfill wastes. Such a release could seriously affect shallow groundwater quality and after a long period of time (estimated 100 years), if left unchecked, may reach a residential drinking water well.

U.S. EPA has used the baseline risk assessment (Chapter 6 of RI), landfill test pit investigation transport and fate evaluation (Appendix A of FS), and the PRP EA to identify current and future releases of hazardous waste from the site that may be of concern. Such evaluations were critical in determining what needs to be done at the site to provide public health and environmental protection. Protectiveness is an essential requirement for Superfund remedial actions. The risk evaluations were used to define specific remedial action goals for site cleanups (page 2-1 to 2-5 of FS).

In addition, the remedial action goals presented reflect other requirements of remedy selection: cost effectiveness, preference for treatment, utilization of permanent solutions to the maximum extent practicable, and compliance with applicable or relevant and appropriate requirements (ARARs) of environmental laws. So, while the risk evaluation (EA) is most certainly considered in remedy selection, it is not the only factor considered.

The formal EA performed by U.S. EPA is not as a result of CERCLA Section 105(a)(8)(A) mandate which requires that U.S. EPA develop "criteria for determining priorities among releases or threatened releases throughout the United States for the purpose of taking remedial action". Such a determination for priority to take remedial action at Forest Waste was already done when the site was evaluated under the Hazardous Ranking System, and placed on the Superfund National Priorities List.

The selected landfill remedy was based on a balanced evaluation of effectiveness, implementability, and cost, and is more elaborately defined and explained in the attached Record of Decision. The effectiveness evaluation is closely tied to the risks posed by the site. A combination of landfill waste treatment and inplace containment with a cap and slurry wall is thought to be both protective and cost-effective. The natural underlying clay deposits will be used as a component of the U.S. EPA remedy, but will not be solely relied upon to provide protection and meet all the remedial action goals.

I.B. Comment

U.S. EPA bases its risk assessment regarding the drums on an erroneous scenario and unsubstantiated fear.

1. The U.S. EPA developed their preferred landfill alternative apparently by focusing on an unsubstantiated fear that 4,000 drums filled with hazardous liquids are buried in the landfill, are ready to burst simultaneously, and may release contaminants into the groundwater at some future date, giving rise to an unacceptable exposure risk.

2. The available data suggest the drums for the most part were crushed before they were buried at the site or have deteriorated naturally.

3. U.S. EPA assumed that half of the estimated 4,000 drums in the landfill were filled with liquids, therefore, their scenario that 4,000 drums filled with hazardous liquids are buried in the landfill ready to burst simultaneously, is erroneous.

4. U.S. EPA's own test pit data revealed only 3 drums out of 43 discovered contained sufficient liquids to extract samples for testing.

I.B. Response

A full characterization of the nature and volume of the landfill drummed waste was not done in the U.S. EPA Forest Waste RI. Magnetometer surveys were run over the landfill, file information about past land disposal practices was reviewed, and a landfill test pit waste characterization was performed. This RI information was evaluated, and manipulated with assumptions, to help evaluate risk at the site and to help develop and evaluate remedial alternatives. Full drummed waste characterization can only be accomplished with complete landfill excavation to identify all drums and by employing an accompanying intense sampling plan. U.S. EPA is fully aware of the limitations of the information, but believes that the information has been useful in remedy selection.

It is apparent from the landfill test pit investigation that there are accumulations of drums in the landfill with high concentrations of hazardous waste (see the FS, Appendix A). Some drums are partially exposed and some are lying on top of the landfill surface. Most of the drums from the test pitting investigation were partially full, although some of the drums were completely full. Few, if any, drums from the test pitting investigation were completely empty and crushed. Some of the drums had associated liquids in them, but no drums, other than the staged drum in area 16, were identified as full of liquid. If U.S. EPA had chosen to, more than 3 of the 43 discovered drums could have been sampled for liquids.

Most of the drums identified were not fully intact. The drums were generally deteriorated and semi-crushed, but for the most part still contained appreciable quantities of materials. These materials were predominantly high in concentrations of volatile organic compounds, which are generally soluble in water by nature, and are thus environmentally mobile.

The estimate for volume of drums in the landfill was developed using available information described on pages F-3 through F-5 of the FS. The limitations of this estimate are presented in Appendix F. The estimate that one-half of the drums contain liquids is presented on page 4-2 of the FS, and was based upon field observation. More importantly, however, this estimate is presented to allow an evaluation of remedial measures for the drummed wastes. Liquid and solid wastes have different acceptable waste handling methods with different associated costs. Some estimate of the quantity of liquid and solid drummed waste was needed in order to develop remedial alternatives for the drummed waste. Such a characterization was not a critical basis upon which U.S. EPA assessed risk from the drummed waste in the landfill.

The crude transport and fate release scenario on pages A-5 through A-6 of the FS presents a possible risk release scenario that illustrates that, with no action taken in the landfill, future release of drummed hazardous substances to the environment may take place, presenting an unacceptable public health and environmental threat. The scenario that a drum of liquid with concentrations of volatile organic compounds, as measured in RI sample DW11, may release to the Forest Waste shallow aquifer, is reasonable based on data from the site. The current condition of waste containment at the landfill would not prevent such a release to the aquifer. Drum failure,

57

furthermore, is possible given the acidic pH values of some wastes identified in the landfill, as well as natural oxidation processes. Although evidence that such a release has occurred is not apparent, the possibility that such a release could happen is reasonable.

This scenario modelled the hypothetical release from one drum. Appendix A of the FS points out that if more than one drum would fail, the possible impact to the shallow aquifer could be greater.

U.S. EPA does not think 4,000 drums filled with hazardous liquids are ready to burst simultaneously and release to the aquifer. Rather, Appendix A indicates that a release from the drums in the landfill, causing significant public health and environmental concern, may occur if the site is not remediated.

The U.S. EPA preferred landfill Alternative SRCVT was developed based on guidance to array alternatives within a treatment range ("Superfund Selection of Remedy Guidance", December 24, 1986). Alternative SRCVT provides treatment to reduce toxicity, mobility, and volume of highly concentrated, mobile waste, but does not eliminate the need for long-term management. For a full understanding of the development of Alternative SRCVT, refer to Chapters 2, 3, and 4 of the FS.

I.C. Comment

The U.S. EPA has misconstrued the permanency preference of SARA Section 121.

1. The U.S. EPA decision-making process at this site has ignored the fact that Section 121 of SARA expresses a preference, not a requirement. The U.S. EPA based their proposed remedy on the concept that this preference is mandatory.

2. The portrayal of the U.S. EPA recommended landfill remedy is estimated to include treatment of 8,000 drums of material, or 2,000 cubic yards of material which comprises less than 1% of the total volume of the landfill. The U.S. EPA proposed remedy of permanent volume reduction of approximately 1% of the hazardous constituent volume cannot be considered a "significant reduction of volume". The treatment portion of the U.S. EPA proposed remedy was questioned to be a "principal" element of the remedy.

3. In selecting the recommended landfill Alternative SRCVT, "U.S. EPA has chosen to allow an undetermined source of unknown drummed waste, comprising less than 1% of the total volume of the landfill to drive its remediation proposal without any evidence of imminent threat to human health or the environment at the expense of increased risk of exposure to workers and the community." Page 18 of "Comments Submitted on Behalf of the Forest Waste Coordinating Committee for the Forest Waste Disposal Superfund Site", February 27, 1988 ("PRP Comments").

4. U. S. EPA's decision at Forest Waste should be compared with the recent U.S. EPA ROD at the Waste Disposal Engineering (WDE) site. The concept of partial or total drum removal is inconsistent with the approaches used at WDE, the Newport Dump, and the Volney Landfill Superfund sites, as well as numerous

closed municipal landfills in the State of Michigan. U.S. EPA should examine the Michigan policy regarding closure of former municipal landfills, which generally has preferred containment.

5. U.S. EPA has failed to perform the final balancing test of remedy selection. Section 121 requires a balancing among the factors of protectiveness, the degree of potential reduction in volume, toxicity, or mobility, and cost-effectiveness. U.S. EPA has totally overlooked or ignored the fact that Alternative SRVC fully satisfies SARA Section 121 because it provides for significant reduction in mobility, together with some treatment, is more cost-effective, and is fully protective. U.S. EPA's own conclusion is that Alternative SCRV is fully protective and attains ARARs.

I.C. Response

U.S. EPA is fully aware that CERCLA Section 121(b) states a preference, and not a requirement, for treatment remedies. In addition to the preference for treatment as a principal element of a remedy, Section 121 of CERCLA also mandates utilization of permanent solutions and alternative treatment technologies to the maximum extent practicable. At Forest Waste, however, significant and permanent treatment as a principal element is practicable, and is a component of the alternative that provides the best balance of the nine evaluation criteria for the site.

Alternative SRCVT was developed as an alternative which provides some treatment to significantly and permanently reduce toxicity, mobility, and volume of waste, but does not eliminate the need for long-term management at the site. The treatment portion intentionally focuses on those wastes that present a significant environmental threat. The wastes associated with drums at the site, due to their physical and chemical nature, are a more significant environmental threat than other wastes at the site. Drum wastes contain high concentrations of toxic, highly mobile contaminants (primarily volatile organic compounds). The concentrated areas of drums in the landfill ("hot spots") constitute the waste of concern in the landfill.

Although the percentage volume of the drummed landfill waste may be small, the nature of this waste indicates that it presents a greater environmental threat than other landfill wastes. Site records indicate that large portions of the landfill contain general household refuse (roughly one-half of the landfill area). Other types of wastes known or thought to be disposed of in the landfill (i.e., PBB-contaminated feed and septic sludge), due to lower toxicity and mobility, do not present as great environmental threats as the drummed waste (See Figure 1-2 of PRP EA, October 9, 1987). It is also significant to note that the incineration treatment intended for the drummed waste is known to be effective and efficient on such highly concentrated organic wastes. While the commenter chooses to limit the interpretation of treatment benefits gained in Alternative SRCVT to a miniscule total landfill waste volume reduction, U.S. EPA notes that an identified waste medium of concern (drummed wastes) will be treated (incinerated) to gain significant and permanent reduction of the toxicity, mobility and volume of that waste medium of concern. Such a treatment component of the preferred remedy is clearly a principal element of the remedy. At this site it does not make sense to apply a shortsighted application of benefits gained from the treatment in Alternative SRCVT to that of only volume reduction of total landfill waste. Benefits gained should be evaluated in light of permanent and significant reduction of toxicity, mobility, and volume of the waste being treated to enhance the long-term effectiveness afforded by the remedy. It is interesting to note that the commenter does not provide any comment on the toxicity and mobility reductions gained in Alternative SRCVT, both of which are significant and permanent.

While the precise number of drums in the concentrated areas of the landfill is unknown at this remedy selection stage, the current information and estimates available identify the drum areas as areas of concern, due to the nature of the contaminants (concentrated toxic, mobile contaminants) and the insecure current disposal situation of these wastes. As explained above, in the case of drum failure, (which, based on the data, is possible) a release of waste to the environment (groundwater) may present an unacceptble public health and environmental threat.

It is important to point out that evidence of a current release of waste to the groundwater within the landfill perimeter exists. Page A-5 of the FS explains that during the test pitting activity, a perched water sample taken from landfill test pit No.5 contained high concentrations of Hazardous Substance List (HSL) constituents also found in a liquid drum waste sample taken from the same test pit. This information suggests that drum failure has already occurred and that it is only a matter of time until the solubilized contaminants percolate to the groundwater.

While the groundwater monitoring scheme surrounding the landfill indicates that contaminants have not yet migrated to the groundwater outside the landfill perimeter, the current insecure disposal situation would not prevent such a migration. Furthermore, the groundwater flow rate in the landfill area is low (estimated to be 2 feet per year) thus, detection of a release by the slightly removed groundwater monitoring scheme will take some time. The nearest monitoring well downgradient of shallow aquifer flow is approximately 100 feet from the landfill.

The containment provided by the cap and slurry wall in Alternative SRCVT will help control migration of released wastes from the landfill area. The drum excavation and treatment is provided to remove those wastes which may not be reliably contained by the cap and slurry wall system (see Response to Comment II.B.) The treatment, furthermore, will significantly and permanently remediate these wastes of concern. An expounded rationale for the remedy selection is documented in the attached Record of Decision (ROD) where the final balancing of the nine evaluation criteria is presented.

The ROD and FS recognize that there is a risk of exposure to the workers and the community during excavation activities. U.S. EPA does not, however, suspect there to be risk of explosion or uncontrolled reaction during excavation, based on the current information on the wastes. The greatest risk appears to be from release of volatile compounds to the air. Some air releases were observed with air monitoring equipment during the landfill test pit investigation. Such releases, however, were not detected several feet away from the excavations, as ambient air apparently rapidly diluted the release.

Safety plans, prescribing worker protective equipment and air monitoring schemes, will be applied at the time of remedy implementation. The risks of drum excavation can be safely managed, and such risks balance against the benefits gained from drum excavation and treatment.

The remedy selection process at a Superfund site is complex. This process requires careful site-specific data collection in a RI, and application of evaluation criteria to an array of alternatives which address site-specific conditions in a FS. Simple application of other remedies selected at other Superfund sites as a grounds for selecting the remedy at Forest Waste, is not appropriate. While partial or total drum removal was not considered appropriate at the Waste Disposal Engineering (WDE) Site, the Volney Landfill, and the Newport Dump, the Administrative Records for those sites support the remedies selected based on site-specific determinations. At Forest Waste the treatment is practicable.

All three of these landfills have characteristics different from Forest Waste. All of these landfills are much larger than the Forest Waste landfill, ranging from 39 acres to 114 acres. None of these landfills appear to have an identifiable concentration of drums or hazardous materials that could be safely excavated.

The ROD for the Volney landfill states that "no known hot spots of hazardous material have been identified in the landfill" (page 2 of the Declaration for the Record of Decision, July 31, 1987). The Newport Dump ROD provides no description of concentrations of hazardous materials, and the site history section describes the site only as a municipal landfill. Forest Waste, on the other hand, was permitted to accept liquid industrial wastes (See page 1-2 of U.S. EPA RI). The WDE ROD does describe a concentrated area of hazardous wastes, but, due to the known presence of incompatible wastes, excavation of these potentially reactive wastes was considered a severe safety risk (page 26 of WDE ROD, December 31, 1987). Forest Waste, as decribed above, does not have a disposal history of or known disposal locations of reactive wastes, and the risks of uncontrolled releases during landfill excavation are minimal.

Superfund remedy selections do include actions where partial waste excavation and treatment is a principal component of the remedy. The RODs for the Metamora Landfill Site in Metamora, Michigan, and the Spiegelberg Site in Livingston County, Michigan, are submitted to the Forest Waste Administrative Record to provide examples of decisions where "hot spot" treatment has been determined to be appropriate.

Applying closure procedures for Michigan municipal landfills as a proper remedial action at Forest Waste is also not appropriate, based on reasoning outlined above. The Forest Waste site has been determined to be a priority for remedial action under the Superfund Program. This site is listed on the National Priorities List for Superfund cleanup. Closing the site as a municipal landfill would

61

not provide adequate public health and environmental protection, particularly relative to protection of release of wastes from the landfill to the groundwater.

U.S. EPA recognizes that Alternative SRCV satisfies all ARARs and provides adequate public health and environmental protection, if it performs as intended. Other containment systems installed, similar to that in Alternative SRCV, however, have been known to fail when contacted with concentrated wastes. Comments received during public comment period seriously question the ability of the containment system to adequately manage the concentrated organic wastes associated with the drums. This information has caused U.S. EPA to reevaluate the FS claim that Alternative SRCV is fully protective.

U.S. EPA does not fully agree with the comment that Section 121 requires a balancing among the factors of protectiveness, degree of potential reduction in volume, toxicity, and mobility, and cost effectiveness. Section 121 mandates that a protective and cost effective remedy be selected. In addition, Section 121 mandates that a remedy which utilizes permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, be selected. In remedy selection, U.S. EPA balances a series of considerations (the nine criteria) to provide for a remedy which satifies the statutory mandates. This balancing has been considered and is documented in the site Record of Decision. U.S. EPA recognizes that Alternative SRCV provides reduction of mobility of hazardous substances, though it notes that this is through waste containment (cap and slurry wall) and not permanent treatment, as is the stated preference of Section 121. Although treatment at Superfund sites is only a preference, Alternative SRCV does not provide such treatment as a principal element, and U.S. EPA believes that treatment of a principal element of the threat at this site is practicable.

U.S. EPA does not agree with the commenter that Alternative SCRV is more cost effective than Alternative SRCVT (See cost-effectiveness discussion in comment I.D., below). The permanent treatment and reliable protectiveness of Alternative SRCVT makes it more cost effective than Alternative SRCV.

I.D. Comment

The U.S. EPA proposed landfill alternative is not cost-effective. The U.S. EPA has paid only superficial attention to the SARA and NCP requirements that cost-effectiveness be evaluated in selecting an appropriate remedy.

1. The recognized U.S. EPA policy that the cost of a remedy must be proportional to its effectiveness has not been followed at the Forest Waste Site. According to the 1985 NCP, during the initial screening of alternatives, a comparison of incremental benefits achieved for incremental costs should be done. The 1987 Draft NCP reiterates the current NCP's endorsement of evaluating incremental cost and benefits. The U.S. EPA Remedy Selection Guidance underscores the importance of assessing cost when comparing alternatives that yield similar results.

2. A U.S. EPA official made a comment to the FWCC that clearly implied that as long as a site is relatively small and the cost of the remedy under consideration does not "shock the conscience", i.e., over $40-50 million, it will be deemed acceptable. This approach ignores the 1987 Draft NCP's requirements of measuring proportional benefit derived from incremental increases in cost.

3. Excerpts from Senator Bentsen's Senate floor debate in the Superfund amendments were provided on pages 22 and 23 of "PRP comments". The PRPs emphasized that Senator Bentsen's comments indicate that cost is a consideration in the determination whether or not a "permanent" remedy is practicable. The PRPs claim that Senator Bentsen's comments imply that there is a requirement for an analysis of cost and benefits of various alternatives.

4. The U.S. EPA preferred landfill alternative is inconsistent with the cost-effectiveness requirements of SARA and the NCP because it completely mischaracterizes the incremental benefit gained by expending $18 million to destroy 1% of the volume. Such a situation is a classic example of why U.S. EPA mandated a cost-effectiveness screening criteria for use at all Superfund sites. A final selected remedy must stop short of requiring huge monetary expeditures for incidental benefits.

5. If U.S. EPA intends to formulate remedies at all Superfund sites similar to the Forest Waste landfill preferred alternative, it is evident that $8.5 billion will not remediate very many sites.

6. The additional $18 million cost, increased short-term exposures to the community and workers during landfill waste handling and transport, and increased difficulty in implementability and maintanence requirements makes Alternative SRCVT less appropriate than the FWCC January 21, 1988, proposal or Alternative SRCV.

7. U.S. EPA's proposed landfill remedy is not cost-effective just because U.S. EPA describes it so. Perfunctory and conclusory statements of cost-effectiveness and inclusion of extremely costly alternatives in order to make another, less expensive, alternative appear cost-effective should have no place in U.S. EPA decision-making.

8. The PRPs questioned as illogical the implication in the Remedy Selection Guidance that if a site is large and complex, treatment would not be considered.

9. The additional cost to implement the U.S. EPA landfill Alternative SRCVT ($22.5 million) is at least $18 million more than the cost to implement the PRP January 21, 1988, remedy ($4 million). The PRP remedy is fully protective, complies with the cleanup standards of Section 121, and complies with ARARs. The U.S. EPA conclusion to spend this additional money to remove and treat drummed waste representing 1% of the total landfill mass is arbitrary and capricious, and is not otherwise in compliance with the law.

I.D. Response

U.S. EPA paid careful attention to the cost-effectiveness requirement in the remedy selection process for Forest Waste. Throughout the decision making process the degree of effectiveness provided by different technologies and remedial alternatives was compared and, where a lesser cost option provided the same degree of effectiveness, the greater cost option was eliminated from consideration. It must be kept in mind, however, that permanent treatment options, which require no long-term residual management of the treated waste, are expensive.

The cost-effectiveness evaluation began in Chapter 3 of the FS, where remedial technologies were screened based on technical and relative cost criteria. Technologies which cost more and provide no incremental effectiveness were screened out. As alternatives were assembled in Chapters 4 and 5 of the FS, cost information was developed, and an array of alternatives was developed with the most cost-effective components selected for the alternatives. Implementability and effectiveness were also considered in assembling alternatives.

The range of alternatives prescribed in the U.S. EPA Superfund Selection of Remedy Guidance (December 24, 1986), were developed in the FS: no action, containment option, and a range of treatment options that include an alternative that would eliminate the need for long-term management and an alternative that would provide some treatment. Extremely costly alternatives (over $50 million) were developed as a result of the guidance that alternatives be developed which require no residual risk management. The alternatives range was useful in identifying and quantifying increased costs associated with greater degrees of risk management. The landfill alternatives developed in detail in the FS varied in the degree to which they involved the long-term management of residual risk, with no two alternatives managing risk in an identical fashion. Table 5-4 of the FS describes the varying degrees of risk management gained with each of the landfill alternatives.

The commenter simplifies the incremental benefit gained in Alternative SRCVT as costing $18 million to destroy 1% of the landfill waste volume. The analysis is ill-contrived in two senses. First, to simplify the benefits gained in the treatment portion of Alternative SRCVT to a reduction of 1% of the landfill waste volume is inaccurate, since the real gain is destruction of hazardous substances and the reduction of toxicity and mobility of the waste (see Comment I.C. above). Second, in identifying $18 million as the cost for the treatment portion of Alternative SRCVT, the commenter has calculated the difference between their cost estimate of the January 21, 1988, proposal and U.S. EPA's cost estimate of Alternative SRCVT, implying that the only difference between the two is the treatment portion in Alternative SRCVT, and that the two cost estimates were calculated in an identical fashion.

There are a number of differences between the PRP and U.S. EPA remedies, a most significant difference being the cap configuration. The PRP cap would cost less money than the U.S. EPA cap. Perhaps more importantly, inadequate information has been provided on the assumptions and source information for the PRP cost estimate. Appendix D of the U.S EPA FS provides the information on how U.S. EPA costs were configured. A comparison of the costs for these two remedies simply is not reasonable. The concerns U.S. EPA has with selection of the PRP remedy are described below in Response to Comment I.I.

A reasonable estimate for the additional cost of the treatment component of Alternative SRCVT is easily derived from the U.S. EPA FS by comparing the costs of Alternative SRCV and SRCVT. This additional cost for permanently treating concentrated areas of mobile, toxic waste, likely to release to the environment, is $13 million. Gaining a permanent and complete treatment of this waste of concern cannot be done less expensively. The risk from that waste is completely managed. Given the direction in CERCLA Section 121(b) for preference of treatment remedies and the mandate to select permanent solutions to the maximum extent practicable, inclusion of such a treatment option in the FS, and selection of an alternative incorporating such a treatment option is consistent with the direction given in the law.

Guidance for balancing the costs of treatment options, which are consistently more expensive than containment options, is given in U.S. EPA Remedy Selection Guidance December 24, 1986 (OSWER Directive No. 93555.0-19): "Cost is an important factor when comparing alternatives of similar results (i.e., cost may be used to discriminate among treatment alternatives, but not between treatment and nontreatment alternatives)." Dismissal of Alternative SRCVT in deference to Alternative SRCV should not have been, and was not done. Complete rationale for selecting Alternative SRCVT is provided in the attached ROD, and balances the nine evaluation criteria.

U.S. EPA believes that the selection of Alternative SRCVT is consistent with Senator Bentsen's Senate floor statements. Cost was considered in determining the practicable extent to which permanent solutions and treatment could be utilized in a cost-effective manner. The incremental costs of treating wastes and providing containment beyond that in Alternative SRCVT were determined as to be impracticable and to outweigh the risk management benefits and, therefore, were not preferable.

Short-term risks to the community were considered in the selection of Alternative SRCVT (see Response to Comment I.C.)

Implementability difficulties were also considered in the selection of Alternative SRCVT. Complete definition of concentrated drum areas, beyond that done in RI phase, can reasonably take place in design phase. Handling and treatment of an estimated 2,000 cubic yards of material (8,000 drums) is not a significant implementability issue.

U.S. EPA believes the maintenance of Alternative SRCVT will be less than that required in the PRP January 21, 1988, proposal. Concentrated mobile waste will be removed from the landfill and completely treated. The need for long-term onsite management of this waste will be eliminated.

The misinterpretation by the commenter of an U.S. EPA official statement that cost evaluations are reduced to an evaluation of threshold acceptability (i.e., over $50 million is unacceptable) is just that, a misinterpretation. Cost is carefully considered on a site specific basis as balanced against effectiveness and implementability.

U.S. EPA recognizes the cost of the Forest Waste landfill remedy and limitations of the Hazardous Waste Trust Fund. The Fund, however, is not the only means to finance cleanup; enforcement actions are also an integral part of the CERCLA program. U.S. EPA does not feel it is appropriate to arbitrarily cap remedy costs based on the size of the Trust Fund. Rather, specific directions given in the law and NCP drive the remedy selection process.

The Remedy Selection Guidance (OSWER Directive 9355.0-19) states that the nature of some sites (e.g., large complex landfills) would preclude the use of alternatives which would involve treatment of the source as a principal element. This guidance reflects the fact that identification of concentrations of source materials, suitable for permanent treatment, is sometimes difficult or impossible at large complex sites. This would make source treatment options impracticable.

Specific responses to comments on the 1987 Draft NCP are not provided. The Draft NCP is not out for public review or Agency use. This document is still undergoing revision, and is not intended to be used as direction for remedy selection. This document was not relied upon in reaching a decision on the Forest Waste remedy.

I.E. Comment

The U.S. EPA proposed landfill remedy, which includes excavation and incineration of drums, would set an unwise new precedent for addressing the problem of municipal landfills.

1. Requiring partial or complete excavation of the tens of thousands of landfills across the country to eliminate "hot spots" was not the intent of SARA. The excessive costs required to excavate landfills in search of the "hidden drum" is a waste of economic resources and defies economic sense. It is not "practicable" to provide the proposed treatment portion of the U.S. EPA recommended alternative.

2. The only way to effectively and efficiently remediate sites such as Forest Waste is through containment and institutional controls. SARA did not intend to eliminate engineered and institutional controls. Use of containment can be a protective and cost-effective remedy.

3. The concept of total or partial drum removal is inconsistent with the approach recently used at other Superfund sites such as the Waste Disposal Engineering (WDE) site, Newport Dump, and the Volney Landfill, as well as at numerous closed municipal landfills in the State of Michigan.

I.E. Response

As described in the Response to Comment I.C., U.S. EPA does not consider Forest Waste Disposal a municipal landfill. This site was licensed to accept industrial wastes and had a number of operational violations during its time of operation. Concentrated areas of hazardous waste have been identified in the Forest Waste landfill.

FWDS has been identified as a priority site of concern for the Superfund Program by its listing on the National Priorities List (NPL). Application of municipal landfill closure activities to this site is not appropriate and is not sufficient to fulfill all the requirements of CERCLA.

Sites eligible for Superfund (Section 104) remedial actions must be identified as a priority through the NPL listing procedure. The Superfund program does not have the authority, nor was it intended to, evaluate and remediate every landfill in the country.

At Forest Waste, the treatment component selected is practicable. Concentrated areas of toxic, mobile, hazardous wastes have been identified, and can be reasonably defined in the design for cleanup. U.S. EPA is not searching for "hidden drums" at Forest Waste, rather it is focusing on concentrated waste disposal areas. Leaving such waste in the landfill presents reliability concerns about the ability of a cap and slurry wall to control releases to the groundwater. Excavation and treatment of the manageable estimated 8,000 drums of hazardous materials and contaminated soils is a practicable approach for gaining long-term effectiveness and permanent treatment as a principal element of the remedy. Containment and institutional controls are an important part of the landfill remedy, however, U.S. EPA chooses not to rely on these controls at this site because it is practicable to perform more active measures.

Comparison of remedial action at the WDE site, Newport Dump, and Volney Landfill are addressed in the Response to Comment I.C.

I.F. Comment

The U.S. EPA proposed landfill alternative fails to adequately consider health and safety risks to workers and the surrounding neighborhood. These short-term risks include the potential for air emissions created during excavation of drums from the landfill and from proposed transport of hazardous materials removed from the site.

1. The Superfund statute states a preference for permanent remedies, but does not eliminate the need for thorough evaluation of risks associated with such remedies.

2. While the U.S. EPA FS noted there were short-term risks in a partial drum remediation, this awareness was not reflected in the final selected alternative. The U.S. EPA has not articulated why the gained treatment in Alternative SRCVT outweighs, on balance, the increased health and safety risk to workers and the community.

3. U.S. EPA has not ignored workers and community safety issues at other Superfund sites. The WDE site is a specific example of such a site.

4. The U.S. EPA did not quantitatively discuss the risk associated with the landfill excavation activities and waste transport.

I.F. Response

The health and safety risks associated with drum excavation and offsite treatment have been considered by U.S. EPA. Table 5-4 of the FS, for example, recognizes and describes these risks. The U.S. EPA perspective on this risk, its relative magnitude at this site and the WDE site, and U.S. EPA intentions to manage this risk, are expounded in the Response to Comment I.C.

A specific quantification of this risk was not done because information from the site specific test pitting activities indicates that risk from air emissions is very low, and data to quantify it are not available. The risk from transport of wastes through communities similiar to Forest Waste has been observed as minimal, and data to reasonably quantify this risk at Forest Waste are not available. These risks are, however, viewed as small and manageable.

The long-term risk of leaving the areas of concentrated drum wastes in place is not viewed by the U.S. EPA as acceptable. Permanent treatment of these wastes is most certainly practicable in this case and provides unqualified permanent management of these wastes. The short-term risk incurred during handling of this waste simply is not significant enough to warrant unacceptable long-term permanent management of this waste. (See also Response to Comment I.B.).

I.G. Comment

The U.S. EPA Proposed Plan is inconsistent with the NCP's requirement for a detailed evaluation.

1. The NCP requirement of detailed analysis of alternatives is wholly lacking from the U.S. EPA's FS. Instead of a detailed analysis, U.S. EPA's FS is replete with conclusory tables and summaries.

2. U.S. EPA has failed to provide a description of its proposed partial remediation of drummed wastes. U.S. EPA has provided no detail on how it will conduct remediation of the 4,000 drums. No scope of the partial drum removal aspect of U.S. EPA's remedy has been defined, and no explanation of the basis for determining completion of that remedy was provided.

3. Such lack of detail deprives the public of information needed in order to reasonably analyze the Agency's proposal. The public was not provided with a meaningful opportunity to evaluate the Proposed Plan and has been deprived of procedural due process.

I.G. Response

The U.S. EPA disagrees with the commenter that a detailed analysis of the final set of assembled alternatives was not done. Beginning on page 5-9 of the FS, a detailed evaluation of landfill alternatives is presented. The entire Chapter 6 of the FS provides detailed evaluation of the groundwater alternatives. A detailed description of the assembled alternatives begins in Chapter 4 of the FS for the landfill alternative. All of the NCP required analyses in Section 300.68(h) are in these chapters of the FS, including: a detailed description of the alternatives, detailed cost estimates, evaluations of implementability, reliability, and constructability, the effectiveness of public health and environmental protection, compliance with ARARs, an analysis of advanced technologies (incineration), and an analysis of adverse environmental impacts. The FS was carefully composed to not be conclusory, and the evaluations presented describe why and how certain evaluation criteria are met. For example, Table 5-4 describes the short- and long-term public health and environmental risk management provided by Alternative SRCVT. Short-term risks are reduced with a landfill cap and deed restrictions which prevent direct contact exposures. The long-term risk of release of wastes to the groundwater is reduced with concentrated drummed waste removal and treatment, and cap and slurry wall containment of the remaining wastes.

As stated in the Response to Comment I.B., a full characterization of the nature and volume of drums in concentrated drum disposal regions of the landfill was not done in the RI, nor is such a characterization necessary for remedy selection. With the current information available, a conservative estimate of the number of drums was developed as presented in Appendix F of the FS. This estimate is 4,000 drums. Alternative SRCVT was configured in the FS to include excavation of these 4,000 drums and an additional 4,000 drums of contaminated soils. Based on drum removal experience, this additional removal of a volume of 4,000 drums of soil is reasonable. The exact extent of waste excavation will not be known until this remedy is actually implemented. To define the drum excavation and staging design prior to the remedy selection, in order to assure complete information about all alternatives under consideration, is not appropriate. A more precise definition of the areas of drum removal will be identified in the remedial design stage.

U.S. EPA recognizes the limitations in the current information about the number of drums to be removed. The cost estimate for this remedy is understood to be crude (an expected accuracy of +50% to -30%) and is based, to some degree, on the estimated number of drums for removal. U.S. EPA is, nonetheless, ready to make a remedy selection decision based on this information. All of this information, and its limitations, has been presented in the remedy selection proposal. The public has been provided with sufficient information to comment on the proposed alternative.

There is some concern in any remedy selection process that the cost information developed is based on grossly inaccurate information and assumptions, and a remedy is selected as cost-effective with very poor cost information. U.S. EPA is currently selecting Alternative SRCVT as a cost effective remedy for the Forest Waste landfill based on the $22.8 million cost estimate with an expected accuracy of +50% to -30%. During the design phase, this cost estimate will improve, and after bids from contractors regarding the cleanup activities are reviewed, the U.S. EPA will have a very good estimate of the cost of implementing Alternative SRCVT. If at any time, the cost-effectiveness determination of this remedy is called into question, U.S. EPA will reevaluate it as the proper remedy for the site.

69

I.H. Comment

U.S. EPA's Proposed Plan fails to adequately analyze the nine criteria set forth in the newly revised NCP.

1. The PRPs evaluated the U.S. EPA proposed landfill alternative and the PRP January 21, 1988, proposed landfill remedial alternative in light of language from the draft NCP.

2. Both remedies are protective of human health and the environment.

3. The PRP remedy complies with all ARARs.

4. Both remedies fully satisfy the 1987 Draft NCP long-term effectiveness criteria.

5. Both remedies meet Section 121 by significantly reducing mobility. The U.S. EPA preferred landfill remedy overreaches the preference for treatment in Section 121 at the expense of cost-effectiveness.

6. The U.S. EPA Proposed Plan ignores significant risks of potential harm to workers and neighbors during excavation, removal, and transport of drums.

7. The containment and treatment remedy proposed by the PRPs is easily implemented. For most Superfund sites, containment is the preferred remedy even when there are greater risks of contamination than those present at Forest Waste.

8. Language for remedy selection from the draft NCP (page 40 "PRP comments") was extracted and applied to the Forest Waste remedy selection process. The conclusion of such application is that U.S. EPA must reevaluate its selected ROD remedy based on the cost-effectiveness argument and must select either the PRP proposed alternative or the U.S. EPA FS Alternative SRCV.

I.I. Comment

The PRP proposed remedy is fully protective.

1. The PRP's landfill remedy is virtually identical to the U.S. EPA FS Alternative SRCV.

2. The multiple layers of protection of the PRP remedy are described:

a) Virtually all rainwater would be prevented from infiltrating the landfill;

b) Installation of the slurry wall will prevent groundwater from entering the upgradient side of the landfill and nothing within the landfill would be allowed to leave the encapsulated area;

c) The 15-20 feet of clay underneath the landfill serves as an excellent floor;

d) If water or leachate moves underneath the cap, extraction wells would collect and cleanup the water or leachate. This aspect of the proposal provides greater certainty than the result the U.S. EPA is hoping to achieve through drum excavation. Liquids from the landfill are treated on an as needed basis over time; and

e) Monitoring wells surrounding the landfill perimeter outside the slurry wall would monitor the system's performance. The natural site conditions of thick, well-defined clay layers and slow groundwater movement would allow ample time to respond should releases be detected.

3. Selection of the PRP remedy over the U.S. EPA remedy eliminates the short term risks of exposure during excavation. The cost savings are also substantial.

4. U.S. EPA's Site Selection Guidance acknowledges the effectiveness and appropriateness of the type of remedy the PRPs propose when it states that such groundwater treatment remedies would "achieve adequate protection".

5. The U.S. EPA FS concluded that Alternative SRCV is fully protective. The U.S. EPA Alternative SRCV complies with SARA, the NCP, and attains ARARs. These conclusions apply to the PRP landfill remedy.

6. The cost-effectiveness advantage of Alternative SRCV and the PRP remedy confirm that either approach would be the only acceptable remedies for the site because they alone satisfy all relevant statutory and regulatory authority. One of these two alternatives should be selected for implementation at Forest Waste.

I.H. and I.I. Response

As stated below, U.S. EPA has not used the 1987 Draft NCP as guidance for remedy selection at Forest Waste. This document is not final and is still undergoing review and potential revisions before its release. The U.S. EPA remedy was evaluated in light of current U.S. EPA guidance (OSWER Directive No. 9355.0-19 "Additional Interim Guidance for FY '87 Records of Decision", July 24, 1987), the current NCP, and CERCLA as amended by SARA.

The U.S. EPA recognizes that there is some merit to the PRP January 21, 1988, proposal in light of some of the evaluation criteria. However it, or Alternative SRCV, are not the preferred remedy for selection. These remedies are not acceptable based on concerns over the ability of the cap and slurry wall containment system to reliably manage, over the long-term, concentrated, highly mobile, toxic wastes in the areas of the landfill where drums were disposed. Neither of these remedies meet the CERCLA Section 121 treatment goal and mandate to utilize permanent solutions to the maximum extent practicable.

The PRP remedy and Alternative SRCV are significantly different in terms of the cap configuration. The PRP cap is not configured in accordance with RCRA guidance to include soil, synthetic membrane, and clay. This difference is significant in the PRP alternative, where the containment system is heavily relied upon to manage the wastes. The PRP cap is not as reliable as the Alternative SRCV or SRCVT cap in preventing precipitation infiltration into the landfill.

The U.S. EPA has concerns about the long-term effectiveness of the PRP Alternative in protecting public health and the environment. U.S. EPA finds this alternative, and Alternative SRCV, less appropriate than Alternative SRCVT, because they both rely heavily on the containment system to manage the drummed wastes. The long-term effectiveness of the PRP alternative or Alternative SRCV is not adequate.

The U.S. EPA recognizes that Alternative SRCV and the PRP Alternative comply with ARARs.

The Section 121 preference for treatment is not met by the PRP alternative or Alternative SRCV. U.S. EPA recognizes that the containment system of these alternatives will help reduce contaminant mobility to the groundwater, but such reduction of mobility is not due to treatment of hazardous substances, and therefore does not fulfill the preference for treatment. Alternative SRCVT practicably meets this treatment preference with permanent and significant treatment of concentrated, mobile toxic wastes. This permanent treatment cannot be achieved in any less expensive fashion. Alternative SRCVT is cost-effective.

The short-term risks to the community during the drum excavation and treatment portion of Alternative SRCVT are minimal and manageable (See Response to Comments I.C. and I.F., above).

Containment remedies are selected at Superfund sites, based on site specific evaluations, when they meet the statutory requirements for remedy selection, and when treatment and more permanent solutions are not practicable. Containment exclusively at Forest Waste is not the preferred alternative. Risks at this site are not appropriately managed with containment alone. Containment alone, furthermore, does not meet the Section 121 preference for treatment. Treatment as a principal element is practicable at this site.

The till floor underneath the landfill will serve well to manage the remaining wastes in the landfill after drum excavation. U.S. EPA does not believe, however, that this floor should be relied upon as a component of a containment system for concentrated drummed wastes.

The commenter has quoted the Remedy Selection Guidance (OSWER Directive 9355.0-19) out of context when stating it claims that groundwater treatment remedies would "achieve adequate protection" at Forest Waste. When reviewing the entire document, it is clear that the guidance is explaining when alternatives, which include treatment of the source as a principal element, can be eliminated from consideration. The guidance directs that such alternatives can be screened when effectiveness, implementability, and cost factors point to treatment as impracticable. In such cases source treatment would be screened, and protection would be achieved typically with containment and groundwater actions. At Forest Waste, exclusive groundwater actions are not the preference, because effectiveness, implementability, and cost factors support source treatment as manageable and practicable.

I.K. Comment

U.S. EPA should have addressed groundwater cleanup action levels in its proposed plan.

1. U.S. EPA has failed to identify any specific target cleanup levels (TCLs) which would trigger the need for evaluation of future groundwater issues.

2. U.S. EPA has failed to identify any specific TCLs in the event future groundwater remediation is necessary.

3. U.S. EPA is required to identify its proposed cleanup levels in order to permit public review and comment. Not doing so constitutes a denial of due process under the U.S. Constitution and is a violation of SARA, the NCP, and the Administrative Procedures Act (APA).

4. The ROD should not identify TCLs for this site.

5. Maximum contaminant levels (MCLs) should be selected as TCLs for this site. This is U.S. EPA's national policy as expressed in numerous U.S. EPA guidance documents and memoranda. Other environmental regulatory programs adopt MCLs as policy as well.

I.K. Response

The proposed plan (page 11, last paragraph) describes that a plan for further groundwater remedial action will be developed for the groundwater plume to the east, if the monitoring program indicates that concentrations of contaminants in the groundwater at the site boundary exceed the groundwater remedial action goals. The groundwater remedial action goals are presented on the top of page 2-4 of the FS. The shallow aquifer at Forest Waste is a drinking water aquifer, and the goals for its protection include maintaining groundwater contaminant concentrations less than MCLs, lifetime health advisories, levels of noncarcinogenic health effect protection (based on reference doses), a lifetime cancer risk range of 10^{-4} to 10^{-7}; and maintaining groundwater quality so that discharge of groundwater to surface water will not exceed Ambient Water Quality Criteria. This information was provided to the public for review and comment.

Many of these goals point to contaminant specific groundwater Target Cleanup Levels (MCLs, lifetime health advisories, health effect protection based on references doses). The other goals will require careful evaluation of all contaminant data (lifetime cancer risk range) and some modelling of groundwater data, to predict discharge concentrations to the surface water (compliance with Ambient Water Quality Criteria (AWQC) at the nearest surface water discharge point).

In the event that future groundwater remediation is necessary around the landfill, it is clear in the FS that the cleanup levels required will be the goals described above. Specific cleanup levels for groundwater around the landfill, beyond the guidance on page 2-4 of FS, were not presented in the Proposed Plan because there are currently no identified releases of contaminants around the landfill.

The groundwater TCLs identified in the ROD are consistent with those presented in the FS. MCLs will be included among the TCLs, however, they will not be the only TCLs.

U.S. EPA agrees with the commenter that MCLs are appropriate for use as a TCL at this site, because the groundwater is a drinking water aquifer. U.S. EPA also recognizes that not all contaminants have MCLs, therefore, other types of health advisories will be used to set cleanup levels. Additionally, because multiple contaminants are frequently encountered at Superfund sites, a cumulative cancer risk level based on all suspected carcinogenic contaminants at the site will be held as a groundwater cleanup goal. Finally, because this groundwater discharges to surface water, use of AWQC will be evaluated in setting groundwater cleanup levels as well.

I.L. Comment

Groundwater remediation is not necessary at this site because of the low level of site-derived constituents and the absence of a completed pathway, both confirming a lack of risk to human health and the environment.

1. Only the shallow aquifer in a limited area immediately downgradient from the lagoons has shown any evidence of site-derived constituents.

2. The shallow aquifer is not a drinking water aquifer. The hydrogeology of this aquifer does not meet the minimum requirements of the Michigan Department of Public Health Water Supply System Specifications for Replacement Wells. Test data from the site show that the shallow aquifer could not sustain a minimum pumping rate of 5 gallons per minute and the System Specifications require that a well installed into and aquifer of the type at Forest Waste cannot have a pumping rate of less than 5 gallons per minute. The average depth to water in this aquifer is 12-20 feet, and the system specifications require that the aquifer must permit at least 25 feet of blank casing below the ground surface.

3. The PRPs offered to undertake groundwater remediation in their January 21, 1988, proposal in an effort to reach a settlement with U.S. EPA and MDNR regarding this site.

4. The U.S. EPA Proposed Plan and PRP FS concluded that groundwater remediation was not necessary at the site because of the low levels of site-derived constituents present and the absence of a completed pathway, both of which confirm a lack of risk to human health and the environment.

74

I.L. Response

The selected groundwater remedial action at Forest Waste is Alternative SR-Site Restrictions. This alternative includes access restrictions to the site, deed restrictions to prevent installation of drinking water wells on the site or in adjacent areas, and a montoring program to identify changes in location and concentration of groundwater contaminants. To date, only low levels of contaminants have been identified in Forest Waste groundwater. With one exception, all RI data have indicated that the current quality of onsite groundwater meets all of the groundwater remedial action goals. (Data have been collected by MDNR subsequent to RI activities. These data are discussed in the Response to Comment II.K.) The one exception includes a detection of trichloroethene (TCE) in an onsite well at 11 ug/l. The MCL for TCE is 5 ug/l.

The RI data indicate that groundwater contamination is limited to onsite areas. Conservative groundwater contaminant modelling indicates that as the current degree of contamination migrates offsite, contaminants will dilute, and the remedial action goals at the site boundary will be met relative to both groundwater and surface water protection. The suspected source of the groundwater contamination, the site lagoons, will be remediated under a previously selected operable unit remedy of complete lagoon removal, scheduled for action this construction season. No significant increases in current onsite groundwater contaminant concentrations are, therefore, expected.

Because offsite releases of groundwater contamination appear to be under control, the selected groundwater remedy addresses adequately the onsite releases with institutional controls. The selected monitoring program will confirm site cleanup goals. If the monitoring program indicates unexpected levels of contamination will migrate offsite, a further plan for cleanup will be evaluated.

Contrary to comment, the U.S. EPA has not concluded that groundwater remediation is not necessary because of the low levels of site derived constituents and the absence of a completed pathway. Under the No Action alternative, onsite shallow groundwater could be used as drinking water. This alternative therefore, would not be protective. Institutional controls are necessary to prevent the use of this groundwater as drinking water. Furthermore, a monitoring program, coupled with the option to take further action, is necessary at this site to assure protection to surrounding surface water bodies.

U.S. EPA maintains that the shallow aquifer has adequate quality, if unaffected by site-derived contaminants, and quantity to serve as a drinking water source. Therefore, it is a drinking water aquifer. Although Michigan Department of Public Health regulations may help prevent its use as a drinking water source, such regulations do not redefine this environmental resource, or the necessary protection for it. It is also important to note that although the average depth to water in this aquifer is 12-20 feet, there are onsite areas where the aquifer would permit 25 feet of blank casing below the ground, and in these areas, the Michigan System Specifications would not prevent use of the onsite aquifer. U.S. EPA recognizes that the pumping rate of the

75

onsite aquifer does not meet minimum Michigan System Specifications requirements.

It should also be noted that the groundwater action at this site is configured to comply with the relevant and appropriate regulation under RCRA for groundwater protection, as discussed in the attached ROD.

The groundwater remediation component of the PRP January 21, 1988 proposal, although somewhat incomplete, does appear to provide adequate public health and environmental protection, and does appear acceptable to the U.S. EPA. Reservations concerning the landfill remediation component of the PRP proposal are outlined above in the response to comments I.H and I.I.

I.M. Comment

U.S. EPA selection of remedies for both the onsite landfill and lagoons has been based on incomplete analyses of available data.

1. U.S. EPA's remedy selection was based on:

a. An inadequate assessment of the groundwater pathways;

b. An inadequate assessment of potential contaminant migration;

c. An inadequate definition of hydrostratigraphic units;

d. Poor analysis and use of geophysical data;

e. Poor analysis and use of available test pit data;

f. Poor timing and inefficiencies in implementing the RI/FS;

g. A cost estimate based on tenuous assumptions;

h. Lack of consideration of important historical perspective which can be gained from existing site conditions; and

i. Consideration of non-existent and/or hypothetical risks which may be posed at the site.

2. The documents submitted by the PRPs have been clearly underutilized by U.S. EPA.

I.M. Response

U.S. EPA has carefully considered all comments made and documents submitted by the PRP FWCC. These documents include, but are not limited to, the comments submitted on behalf of the FWCC (February 27, 1988) and the Technical Comments on the U.S. EPA Remedial Investigation Report (December 17, 1987), the FWCC FS (December, 1987), and Endangerment Assessment (October, 1987). These, and all documents considered in the remedy selection, are included in the site Administrative Record.

Many of the comments submitted in the documents (above) focus on the site lagoon wastes and suggest an appropriate remedy for the lagoons. The lagoon remedy selection has already been made and is documented the ROD for the lagoon operable unit (June 30, 1986). As these recent documents were submitted after selection of the lagoon remedy, they obviously were not considered in the lagoon remedy selection.

The PRP comments on the RI focus heavily on the limited extent and current use of the onsite shallow aquifer as a drinking water source. The PRPs also focus heavily on the fact that the shallow aquifer is underlain by low permeability glacial deposits which are continuous over the site, and serve to separate the shallow from the deeper aquifer in the area of the site.

U.S. EPA recognizes the regional setting of the shallow onsite aquifer depicted graphically in Figures 3 and 4 of the PRP FS (December 17, 1987). On such a large, regional scale, the shallow onsite aquifer does appear relatively small, as would almost any geologic unit when placed in a comparatively larger regional setting. U.S. EPA also recognizes that there is a low permeability till layer underneath the shallow aquifer that potentially acts as an aquiclude (page 4-3 of the RI) and that there is probably limited hydraulic connection between the shallow and deep aquifers (page 4-5 of the RI).

U.S. EPA also recognizes that currently there are no users of the onsite aquifer as a drinking water source. U.S. EPA does, however, believe that the presentation of residential well locations show in Figures 1 and 4 of the PRP FS is misleading. The PRP document apparently presents only locations of residential wells for which they could find available well logs. A visit to the site area makes it clear that several more residences with drinking water wells are closer to the site than depicted in the PRP FS. These residence locations are illustrated in Figure 3-6 of the RI. Perhaps more importantly, the PRP analysis of percentage of residential wells in the different aquifers under the site is based on incomplete information. U.S. EPA, on the other hand, recognizes that well logs are not available for many of the residences surrounding the site, and the possibility that these residences use the shallow aquifer certainly exists. U.S. EPA does not believe that the current incomplete well log information should be used to calculate the percentage of residential wells in different aquifers under the site.

The PRPs argue that the risks posed by Forest Waste are non-existent and/or hypothetical. As described in the Response to Comment I.B., the U.S. EPA and PRP Endangerment Assessments were used to evaluate risks for the site, and compare site Remedial Action Goals (Chapter 2 of the RI). Limited current use of the onsite shallow aquifer does not dismiss the need to protect it from current and future releases of site contaminants, in order to protect both public health and the environment.

It was noted by the PRPs that unfiltered groundwater samples were analyzed in the RI (page 6 of the PRP RI Comments). Although collected, these data were not used to assess risk at the site. Filtered groundwater sample analyses were used in the U.S. EPA Risk Assessment (Chapter 6 of the RI).

77

The PRPs express concern about the interpretation of groundwater flow in the deep aquifer as presented in the U.S. EPA RI. U.S. EPA acknowledges that the interpretation of this flow is somewhat uncertain. However, the remedy for Forest Waste is configured to protect the shallow onsite aquifer, and conclusive information on deep aquifer flow is not needed for proper remedy selection. In the RI, investigation of the deep aquifer was done primarily to determine if it was impacted by site contaminants. The site has not been shown to have affected the deep aquifer. Similarly, the PRP concern (page 7 of the PRP RI Comments) about the description of hydraulic conductivity measurements in the deep aquifer as presented in the U.S. EPA RI is not significant in remedy selection for the site.

The PRP objection pertaining to interpretation of geophysical data presented in the U.S. EPA RI is also not a significant concern. As mentioned in the RI (pages 3-2, 4-7, 4-8), the resistivity survey provided preliminary information regarding the geologic conditions which was then used to select monitoring well locations for the RI sampling efforts. Interpretations of the data also identified a potential contaminant plume, underlying the entire landfill area and extending offsite to the east and southeast (Figure 4-7 of the RI) as well. Chemical analyses of monitoring well samples taken over the entire area identified a much smaller plume, primarily southeast of the lagoons, characterized by detected organic contaminants and high inorganic constituent concentrations relative to background levels (Figures 4-11, 4-12, 4-14, 4-15, 4-16 of the RI). This area is also characterized by high specific conductance readings (1000 umhos, Figure 4-10 of the RI). It is this smaller area that is identified as the groundwater plume at the site for which groundwater remedial action is considered under the groundwater operable unit in the FS.

The PRP comments (on pages 11-13 of their RI Comments) which question the extent of constituents detected to date in the shallow aquifer were considered. These comments support the selection of the groundwater Alternative SR - site restrictions and groundwater monitoring.

The uncertainities associated with, and the use of, test pitting data are explained in the Response to Comments I.B., I.C., and I.D.

Order-of-magnitude cost estimates (+50% to -30%) have been properly calculated with available information in order to support selection of the remedy for this site.

The PRP comment that U.S. EPA based the selected remedy on "poor timing and inefficiencies in implementing the RI/FS" is not explained. U.S. EPA maintains that the selected remedies for the site: the fence (1984), the lagoon operable unit (1986), and the landfill and groundwater operable units (1988), were all selected as soon as proper information was available. This phased approach to remedy selection allowed the U.S. EPA to make steady progress towards complete site remediation at an accelerated pace.

The PRP comment that U.S. EPA based the selected remedy on "lack of consideration of the historical perspective which can be gained from existing site conditions" was also not explained. U.S. EPA maintains that there are current releases of hazardous substances to the environment from Forest Waste, and the site must be remediated to prevent further site releases.

I.N. Comment

The U.S. EPA RI does not indicate whether former site operations have impacted surface water conditions in the area of the site.

I.N. Response

The effect of site operation on the quality of surface water near the site was thoroughly investigated in the RI. The type and distribution of organic and inorganic compounds detected in the surface water did not reveal any patterns of contamination. The investigation was inconclusive with regard to directly linking site contaminants to degradation of nearby offsite surface water.

I.O.1 Comment

The Forest Waste Coordinating Committee (FWCC) state they have been denied due process of law because the comment period of 30 days was too short to review and analyze "large amounts of technical data and Agency analysis which were developed over two years." They claim the length of the comment period precluded any meaningful opportunity to provide effective comments. The FWCC cite a 1981 U.S. EPA guidance document that suggests a 60 day comment period for complex issues or lengthy documents. That guidance document also outlines a procedure for public participation and states that Agency officials "must avoid advocacy and precommittment to a particular alternative."

I.O.1 Response

The National Contingency Plan (NCP) is the promulgated implementing regulation for SARA. At 40 CFR Section 300.67(d) it requires a public comment period of not less than 21 days. The comment period in this case was 30 days, beginning January 29, 1988, and ending February 27, 1988. 40 CFR Section 300.67(d) also states that public meetings should be held during the public comment period in most instances. SARA Section 117 also states that there should be an opportunity for a public meeting at or near the facility and a transcript of the meeting should be kept. The U.S. EPA and MDNR held a public meeting at the Forest Township Hall in Otisville, Michigan, near the site, on February 17, 1988, and a transcript was made of the meeting.

An Endangerment Assessment (EA) on the FWD site was prepared by the FWCC based on the information they had available, and submitted for inclusion in the site Administrative Record (AR). The FWCC EA is dated October 9, 1987.

The U.S. EPA Remedial Investigation (RI) report, the basis for the Feasibility Study, was available for public review in early September 1987. The FWCC has submitted comments on the U.S. EPA RI, dated December 12, 1987. The FWCC drafted their own Feasibility Study, dated

79

December 18, 1987, based on U.S. EPA's RI and has submitted it to the U.S. EPA for inclusion in the site AR.

SARA Section 117(a) requires that a Proposed Plan be made available to the public. The U.S. EPA's Proposed Plan was made available to the public on January 29, 1988. By definition, the preferred alternative in the Proposed Plan is a statement of preference for a particular remedy, subject to change based upon public comment.

U.S. EPA has complied with the requirements of SARA and the NCP regarding public participation. SARA and the NCP are controlling, as the statute and implementing regulations, over any pre-SARA guidance document regarding public participation.

The FWCC has been actively involved with this site since May 1986. They met with the U.S. EPA on numerous occasions prior to the signing of the lagoon operable unit ROD in June 1986. Similarly they met with U.S. EPA on November 24, 1987, January 13, 1988, and January 22, 1988, prior to the public comment period for the Proposed Plan and Feasibility Study, which was released for public comment January 29, 1988. They also met with the U.S. EPA February 23, 1988, and have spoken with U.S. EPA technical and legal representatives at their will. It is therefore the conclusion of the U.S. EPA that the FWCC was not denied due process based on a 30 day comment period, particularly in light of their access to the U.S. EPA.

I.0.2 Comment

The FWCC claim they have been denied due process because the proposed plan was not sufficiently detailed, thus precluding meaningful evaluation of the Proposed Plan and preferred alternative. They state that the plan did not outline the technical boundaries or operative rules for the partial remediation, it did not outline cleanup levels for the work, and there was no substantive analysis regarding the proposed alternatives.

I.0.2 Response

The partial remediation as described in the U.S. EPA FS includes excavation of an estimated 0.8 acres, an estimated 4000 drums of waste, and an equal volume of associated contaminated soils. The limitations and usefulness of these estimates are discussed in the Responses to Comments I.B., II.A., II.C. The exact location of the partial excavation and drum removal will be determined during remedial design. The comment regarding cleanup levels is discussed in the Response to Comment I.K. The response to the concern about lack of sufficient detail in the Proposed Plan and FS is discussed in the Response to Comment I.G. The U.S. EPA believes there is sufficient detail in the FS and Proposed Plan to evaluate the alternatives. Additionally, the Administrative Record for this ROD has been available to the public and the FWCC at the Forest Township Library in the Otisville, Michigan. It contains all of the information U.S. EPA considered in evaluating the alternatives and developing the Proposed Plan.

I.O.3 Comment

The FWCC was denied due process because SARA does not require a formal hearing regarding remedy selection.

I.O.3 Response

There was a public meeting held at the Forest Township Hall in Otisville, Michigan, on February 17, 1988. The public and the FWCC were given an opportunity to comment during the meeting.

I.P. Comment

The PRPs submitted for U.S. EPA review and consideration a Feasibility Study for the FWD site prepared for them by Geraghty and Miller Inc., (G&M) dated December 18, 1987. Response to this document is not required because it was not submitted during the January 29-February 27, 1988, Public Comment Period, and it does not comment on the U.S. EPA Proposed Plan or Feasibility Study. A response is, however, provided below due to the misleading characterizations presented in the Geraghty and Miller study.

I.P Response

The G&M FS presents an array of remedial alternatives which incorporate remediation of the onsite surface impoundments. Presentation and evaluation of such remedies serve no useful purposes at this point in remedy selection. The surface impoundment remedial action for FWD was selected in June 1986, and is now in design phase.

The G&M FS starts with an introduction in Chapter 1 and a statement of remedial action goals and a technologies screening in Chapter 2. The presentation of goals is confusing. Specific cleanup levels or goals for the waste media of concern are not presented, as in Chapter 2 pages 2-3 and 2-4 of the U.S. EPA FS. A discussion and complete listing of applicable or relevant and appropriate (ARARs) Federal and State environmental laws is also missing from the G&M FS. Mention of the preference for treatment and mandate for permanent solutions to the maximum extent practicable in CERCLA Section 121 is wholly lacking.

The technologies screening presented in the G&M FS is lacking detail and conclusory. Cursory descriptions in Table 2 of the G&M FS do not serve to adequately provide screening for technologies. Figures 2-3, 2-4, 3-4, and 3-5 of the U.S EPA FS by comparison provide proper and complete detail. The G&M FS, furthermore, arbitrarily screens partial drum excavation without supplying the basis for the screening on effectiveness and cost grounds.

The alternatives array portion of the G&M FS is also confusing and incomplete. The rationale regarding the protectiveness provided by the arrayed alternatives is not presented. Specific remedial action goals

81

were not presented, therefore, a comparison of goals met by alternatives arrayed was not possible. The descriptions of alternatives are cursory, and the effectiveness and implementability benefits and issues for each alternative are seriously lacking detail. One of the many major implementability issues ignored in the G&M FS are those associated with offsite land disposal, due to RCRA Land Ban. By comparison, Chapters 4, 5, and 6 of the U.S. EPA FS clearly explain the rationale for alternatives arrayed, provide complete details of alternatives descriptions, and provide careful evaluations of alternatives relative to evaluation criteria.

A central risk management judgement made in the G&M FS to which U.S. EPA takes exception is the assessment that protection of the shallow groundwater aquifer is not needed, since no existing groundwater pathways are complete, and no probability exists for future completion (page 38 of G&M FS). U.S. EPA believes the shallow groundwater should be provided protection consistent with the groundwater remedial action goals on page 2-4 of the U.S. EPA FS. (See Response to Comment I.L.)

Chapter 4 of the G&M FS is lacking detail and conclusory. The risk management judgement that the G&M FS Alternatives AA-3 is protective is not supported in the FS. U.S. EPA, furthermore, disagrees that such an alternative provides adequate protection.

II. Comments from Michigan Department of Natural Resources (MDNR), surrounding residents, Michigan State Congressional Representative Nate Yonkers, Mr. Ronald Willson, and Michigan Department of Public Health

The above parties have submitted comments that argue that the U.S. EPA preferred landfill alternative, Alternative SRCVT, is inappropriate because it does not provide a fully protective remedy. Some parties also preferred, over the U.S. EPA preferred groundwater alternative, Alternative SR, a purge and treatment groundwater alternative, such as Alternative CTGD, which was evaluated in the U.S. EPA Feasibility Study.

Note: The State of Michigan has requested in its formal comments that all previous Feasibility Study and Proposed Plan comments from the MDNR and other State agencies be incorporated into the Administrative Record for the site. Comments submitted on final U.S. EPA documents are included in the Administrative Record and are considered in remedy selection. To the extent that comments on draft U.S. EPA documents are considered prior to the finalization of the document, they have been embodied in the Administrative Record available for public comment. Draft documents and comments on such documents are not independently considered in final remedy selection and, therefore, are not appropriate for inclusion in the Administrative Record. Comments on Feasibility Study and Proposed Plan draft documents from the State will not be included in the Administrative Record. The full set of comments submitted by the State during the public comment period is included in the Administrative Record and the comments have been addressed in this Responsiveness Summary.

Comments

II.A Comment

Various locations in the Public Comment Draft Feasibility Study and Proposed Plan should be clarified to explain that Alternative SRCVT is configured to include excavation of only 0.8 acres of the 11 acre landfill. It should also be clarified that such an approach to site cleanup would remove an unknown percentage of drums in the site landfill. The FS misrepresents Alternative SRCVT.

1. Since the percentage of drums removed is unknown in Alternative SRCVT, the long-term effectiveness provided by this alternative should be described as unknown.

2. The Proposed Plan fails to articulate the limited and uncertain extent of drum removal in Alternative SRCVT.

3. The Public Comment Draft FS deliberately misleads the public with regard to protectiveness of Alternative SRCVT.

4. A bias for Alternative SRCVT is evident in the Public Comment Draft FS.

8. Originally envisioned, Alternative SRCVT was not going to assure complete removal of drums in the landfill.

II.C. Response

As indicated in the Response to Comment II.A. U.S. EPA recognizes the need to collect more information about the nature of drummed waste in the landfill. Alternative SRCVT is intended to identify, and remove and treat all concentrated areas of drummed waste in the landfill. Excavated portions of the landfill in Alternative SRCVT will not necessarily be limited to centers of high magnetic anomalies. As explained in the response to comment II.A., the 0.8 acre area of the landfill was used in the FS primarily as an aid to estimate the number of drums in concentrated disposal regions. Although U.S. EPA does not have a good estimate of the cost of the necessary waste characterization, $100,000 to $250,000 is not an unacceptably large sum of money for this task.

The commenter's suggestion to investigate magnetic anomalies in seven acres of the landfill is well taken. U.S. EPA appeals to the commenter (MDNR) to specifically identify the anomalies they are concerned about. At this time, U.S. EPA intends to investigate those anomalies greater than 4,000 gammas from the Keck 1984 magnetometer survey and greater than 500 gammas from the U.S. EPA 1986 magnetometer survey, as identified in Figure 4-8 of the RI. Data collected to date suggest that this would identify areas of concentrated drum disposal.

In Alternative SRCVT, U.S. EPA does not intend to excavate the entire landfill, or investigate areas of the landfill without suggestion of drummed waste disposal. U.S. EPA recognizes the limitations of using magnetometer data to identify areas of drummed waste disposal. The magnetometer data along with other information which suggest drum disposal regions (file information, test pit logs, air photos) will be used to direct further investigation in remedial design to identify drum disposal regions. It should be noted that, to date, most information gathered about drum disposal regions coincides with magnetic anomalies from magnetometer surveys.

Full characterization of the entire landfill will not take place in the design of Alternative SRCVT, and because of that, removal of all drums in the landfill cannot be assured with this alternative. U.S. EPA agrees with the commenter that Alternative SRCVT was not intended to assure complete drum removal. This alternative in the FS development process was, in fact, in response to the commenter's (MDNR) suggestion in their review of the draft FS. As mentioned in the Response to Comment II.A., information collected in the RI indicated that there are concentrated areas of drums in the landfill, thus development of a partial landfill excavation alternative, such as Alternative SRCVT was possible.

The limitations and benefits of the slurry wall containment system are presented in the Response to Comment II.C. U.S. EPA has concerns about use of the containment system to assure long term protection of public health and the environment, without removal of concentrated drummed wastes, and therefore has selected Alternative SRCVT. U.S. EPA intends to adequately define these source materials in remedial design. Bulk wastes in the landfill, based on site file information and test pit sample analyses of these wastes, do not appear to be of the same toxic, highly mobile nature as the drummed waste. The wastes, therefore, are not targeted for full characterization and excavation. These wastes will be managed with the containment system component of Alternative SRCVT.

As explained in the Response to Comment II.A., Alternative SRCVT was developed based on available information to aid in the remedy selection process. Test pit data were used in the FS to develop Alternative SRCVT, and calculate a cost estimate for it. How that information was used, and the assumptions associated with the use of that information is presented in the FS. The FS did not "misuse" RI data. A more precise volume estimate of the number and types of drums in the landfill will evolve through the remedial design and action activities in Alternative SRCVT.

II.D. Comment

The drummed wastes in the Forest Waste Disposal landfill discovered during the RI landfill test pit investigation included a surprisingly high number of intact drums, and a high percentage of drums with liquids in them.

1. The limited test pit RI data indicates that approximately half of the Forest Waste landfill drums contain liquid waste, generally solvents.

2. The statements in the FS that test pit soils surrounding the drums were found contaminated with the same constituents present in the drums, and that these data suggest that either past disposal practices included dumping of uncontainerized liquids and sludge or drum leakage has occurred, is supported.

3. The statement in the FS that about one-half of the drums in the landfill contain liquid (page 42) is thought to be a prudent evaluation.

II.D. Response

The purpose of the test pit investigation, as emphasized in Response I.B., was to confirm certain historical information regarding past disposal practices at the site, not to characterize the landfill wastes.

The findings of the test pit investigation revealed the presence of buried drums in the landfill, some containing liquids. These findings, albeit not anticipated from historical file information, were useful in developing remedial alternatives addressing the threat to human health and the environment from these contaminant sources.

The test pit findings regarding contaminated soil adjacent to the buried drums support the removal and complete treatment of an additional volume of associated contaminated soil along with drum removal in the SRCVT alternative. Removal of this contaminated soil is also accomplished in the complete removal alternative RDN, RDF, and RTD; however, complete treatment

85

of this highly contaminated soil is performed only under Alternatives SRCVT and RTD. Alternatives RDN and RDF provide for onsite or offsite containment of this material without treatment. To generalize that half of the burred drums in the landfill contain organic solvents is a misinterpretation of the FS assumptions regarding the drummed materials. The assumption that half of the drums contain liquids was necessary to assign costs to remedial action alternatives that involve handling (drum staging and ultimate treatment and disposal) the drums once removed from the landfill. This assumption was not used as a basis for quantifying risks associated with drummed materials at the site.

Refer to Response I.B. for additional clarification of FS assumptions and test pit investigation results.

II.E. Comment

Failure to investigate and excavate readily identifiable areas of drum concentrations in the seven acre area of the landfill with magnetic anomalies does not comply with Section 121 of SARA which states a preference for treatment technologies and permanent solutions to the maximum extent practicable.

1. The U.S. EPA landfill remedy does not go far enough. A complete excavation of the waste in the landfill is necessary. If it is not done, we are just inviting problems in the future.

II.E. Response

As explained in the Response to Comment II.C. U.S. EPA intends to identify readily identifiable areas of drum concentrations in an approximate seven acre area of the landfill with magnetic anomalies. As explained in the Response to Comment II.C., the treatment component of Alternative SRCVT will provide significant and permanent treatment of toxicity, mobility, and volume, of the wastes of concern, and therefore clearly meets the CERCLA Section 121 preference for remedies that employ treatment as a principal element.

U.S. EPA does not feel that complete excavation of waste in the landfill is necessary. Treatment of the waste of concern, coupled with secure onsite containment of the less mobile remaining waste, provides adequate protection of public health and the environment.

II.F. Comment

During design phase investigation, after proper landfill waste characterization, the current estimate of 4,000 drums of waste within concentrated drum areas may be exceeded. If that occurs, the difference in total cost between Alternatives SRCVT and RDN dramatically decreases as the number of drums increases. At the conclusion of design data collection, if the cost of Alternative SRCVT approaches the cost of Alternative RDN, U.S. EPA should consider implementation of Alternative RDN.

The MDNR favors selection of an alternative with at least the protectiveness of Alternative RDN as do approximately 75 community residents. The MDNR cannot concur with the current U.S. EPA recommended landfill Alternative SRCVT.

1. U.S. EPA should commit to do additional test pitting in the suspect 6 acres to determine the absence or presence of additional drums. If additional drums are not found, then the U.S. EPA remedy would be confirmed as fully protective. If additional drums are encountered, then U.S. EPA should commit to their removal from the landfill. If, as described above, the costs of Alternative SCRVT approach the costs of Alternative RDN, U.S. EPA should consider implementation of Alternative RDN. If U.S. EPA would adopt this approach, it appears to provide a suitable compromise between U.S. EPA and MDNR, and would assure implementation of a fully protective remedy at this site.

2. The comment in the FS that Alternative RDN eliminates risks associated with exposure and significantly reduces the potential for release and migration of contaminants, since contaminated materials are removed from their uncontrolled situation and disposed of in a more secure storage situation, is strongly supported.

3. A constructed RCRA type facility with a leachate collection system would likely have a high degree of longer term protection than the proposed slurry wall.

II.F. Response

U.S. EPA intends to do the degree of landfill waste characterization necessary to identify concentrated areas of drummed waste disposal in the landfill. See Response to Comment II.C.

U.S. EPA cannot necessarily support the comment that if greater than 4,000 drums of waste are found in concentrated drum disposal regions of the landfill, the total cost difference between Alternatives SRCVT and RDN dramatically decreases. It should be noted that as greater than 4,000 drums of waste are found, the costs of both Alternatives SRCVT and RDN will increase, since both remedies assume incineration treatment for the identified drums, the cost of which will increase as the number of drums increases.

A careful cost evaluation of both of these alternatives would need to be done at the time the new information is available before the claim made by the commenter is refuted or supported. No such careful cost evaluation was submitted by the commenter. If, after remedial design, however, there is reason to believe the cost difference of these two alternatives is dramatically less than as presented in the FS, a carefully reevaluation of the estimated costs of these two alternatives can be done.

At this point in time, no commitment can be made to select Alternative RDN over Alternative SRCVT based on the potential cost reevaluations.

87

Alternative SRCVT has been selected as the most appropriate cost-effective alternative based on consideration of the nine evaluation criteria. New cost information in remedial design may require a reevaluation of the cost effectiveness finding of Alternative SRCVT, however such a reevaluation must consider all of the nine evaluation criteria.

U.S. EPA recognizes that Alternative RDN provides significant long term risk reduction relative to potential releases and migration of contaminants. U.S. EPA also recognizes that a RCRA-type cell provides greater protection than the proposed slurry wall. Given, however, the nature of the remaining landfill wastes after the drum excavation in Alternative SRCVT, the proposed containment system of cap and slurry wall will provide adequate public health and environmental protection. In addition, the waste handling issues associated with excavation and redisposal of all wastes in the 11 acre landfill, present significant implementability issues associated with Alternative RDN. The implementability issues, along with the additional cost of Alternative RDN, make it less attractive for selection than the protective Alternative SRCVT.

U.S. EPA recognizes that the State does not concur with the recommended landfill Alternative SRCVT, and recognizes the limitations this places on U.S. EPA's ability to use Hazardous Waste Trust Fund monies to clean up the site, since a 10% cost share match is needed from the State before remedial actions using Hazardous Waste Trust Funds monies can commence.

II.G. Comment

Alternative RDN and RTD are not clearly portrayed in the FS.

1. The FS fails to clarify that Alternative RDN provides complete drum removal with a known remaining risk associated with the rest of the landfill waste which will be removed and placed in a RCRA-type cell onsite.

2. The descriptions of RDN on pages 4-20 and 4-21 and RTD on pages 4-21 and 4-22 of the FS are unclear. What is the basis of waste quantity calculation? What will happen to the former landfill area? Is this meant to be clean closure?

II.G. Response

The FS assumes that excavation of drums and highly contaminated associated soil from areas identified by high magnetic readings will remove the principal threat to public health and the environment associated with releases from drummed liquids in the landfill. This is a component of Alternative SRCVT. The alternative recognizes that risks do remain at the site but are adequately addressed by the slurry wall, cap, and long-term groundwater monitoring around the landfill.

The number of drums removed under Alternative SRCVT is based on calculated drum densities from test pits in areas that had high magnetometer readings. This information is summarized in Appendix F. Drum densities in areas not

5. Alternative SRCVT should be described to reflect accurately that only 0.8 acres of the 7 acre area of magnetic anomalies will be excavated and that no attempt will be made to locate any additional drums or to excavate the outer margins of the 0.8 acre area if drums are still visible.

6. The effectiveness of Alternative SRCVT has been misrepresented in the FS because it assumes all drums will be removed from the landfill.

II.A. Response

The precise and specific definition of the landfill areas which will be excavated in Alternative SRCVT is not yet defined. As was stated in the Response to Comment I.B., a full characterization of the nature and volume of landfill drummed waste was not done in the site RI. Information was collected in the RI to aid in arraying a range of remedial alternatives, and to aid in developing and evaluating those alternatives in an FS. The RI and FS then are used to support and facilitate the site remedy selection.

The information that has been developed on the site indicates that there are concentrated areas of drummed waste disposal in the landfill. Figure 1-2 of the Endangerment Assessment, dated October 9, 1987 (performed by Life Systems, Inc. for the PRPs) presents an interpretation of the drummed wastes locations in the landfill, based on site records, site geophysical surveys, test pit logs, air photos, and interviews with persons involved with the site. This figure agrees with Figures 4-8 and 4-9 of the U.S. EPA RI which suggest locations of concentrated areas of drummed waste disposal. In general, the U.S. EPA RI landfill test pit investigation confirmed a relationship between high magnetic anomalies from magnetometer surveys at the site, and concentrated areas of drummed waste disposal. An exception to this relationship was test pit data from test pit No. 03, which contained heavy metal soft drink machines and general refuse in an area of relatively high magnetic anomaly. Information which indicates that there are concentrated areas of landfill drummed waste disposal allowed Alternative SRCVT to be developed. Assumptions nonetheless were needed to develop a reasonable cost estimate for this alternative.

A critical component of the Alternative SRCVT cost estimate is the number of drums in concentrated disposal regions. This was conservatively estimated to be 4,000 as presented in Appendix F of the U.S. EPA FS. This estimate of the number of drums was generated by identifying an area (number of square feet) of the landfill with strong magnetometer readings, and multiplying that area by the concentration of drums observed in strong magnetic anomaly areas during the test pit investigation. The area of the landfill with strong magnetic anomaly readings is approximately 0.8 acre. This area is not meant to represent which, and only which, areas of the landfill will be addressed during Alternative SRCVT remedial design and action. The 0.8 acre area aided in estimating the number of drums in the landfill for a cost estimate.

Further information will be developed in remedial design to define the areas of concentrated drummed waste disposal in the landfill. See Response to Comment I.C. above. The 0.8 acre identified in the FS to aid in cost estimating does not define the scope of excavation in Alternative SRCVT.

The intention of Alternative SRCVT is to completely remove concentrated areas of drummed waste. This alternative will not, however, assure complete removal of all drummed wastes because complete landfill excavation will not take place, and removal of all drums from the landfill cannot be assured unless the full landfill is excavated. The FS clarifies this in several locations, including page 4-9 and Table 5-4. A clarification addendum to the FS was also developed which clarifies this point. Finally, the Proposed Plan on page 7 describes the drum excavation of Alternative SRCVT as the excavation of areas of the landfill with concentrated drummed waste, and further clarifies that the drum removal activity will be limited in scope to excavation of approximately 0.8 acres of the 11 acre landfill. (It should, however, be mentioned again that the 0.8 acre served primarily as a means to estimate the number of drums in concentrated drums regions). Both the FS and Proposed Plan clearly articulate the limited extent of drum removal. The uncertainty associated with not excavating the full landfill areas is obvious from the description of this alternative as a partial landfill removal.

The effectiveness of Alternative SRCVT is portrayed fairly in the FS. No FS alternatives are described in exact or quantified measures of effectiveness and Alternative SRCVT, likewise, cannot be so described. Table 5-4 does, however, describe how effectiveness is gained with this alternative, and carefully explains that concentrated areas of drummed materials will be removed and treated, thus gaining long term effectiveness. This is a fair portrayal and is not misleading. Although not quantified, the long term effectiveness of this alternative is not unknown.

U.S. EPA disagrees with the commenter that presentation of Alternative SRCVT in the FS and Proposed Plan is misleading. U.S. EPA maintains that the descriptions and evaluations of this alternative are objective and without bias. The commenter claim of a biased presentation of Alternative SRCVT is not supported with detail, therefore, is responded to in no greater detail.

II.B. Comment

There are limitations to the proposed slurry wall and the use of the existing underlying natural clay in Alternative SRCVT.

1. If free, highly mobile solvents were generated in the landfill, the slurry wall system keyed into the underlying clay could not be relied on to direct such concentrated waste liquids to a leachate collection system. This is because the underlying clay is unengineered. The condition of the underlying clay is unknown, however, it is most probably not a smooth, sloping clay surface that will direct liquids to the proposed recovery

wells. Since many of the wastes are known to have been deposited in dug pits, the likely configuration of the clay surface is uneven and pitted, allowing for ponding and pooling of liquids on its surface.

2. Solvents of the type found at this site are known to penetrate clays. Such penetration would reduce or mitigate the containment provided by the underlying clays in U.S. EPA remedy. At the Clare, Michigan Superfund site, similar solvents have penetrated through more than 16 feet of tight, natural clays.

3. Slurry walls are not meant to contain concentrated solvent waste, but only to manage contaminated groundwater that is essentially water-based. Slurry walls do not effectively contain concentrated organics.

4. The proposed depth and width of the slurry wall are not adequate.

5. The statement in the FS that the cap is a vertical barrier, and that monitoring reduces the threat of contaminant migration, but does not eliminate it, is supported.

6. A slurry wall and cap in not reliable is preventing releases from drum rupture. Drum releases result from corrosion of drums.

7. The long-term residual risk discussion of Alternative SRCVT on Table 5-4 of the FS should read that "The vertical barrier will reduce and control migration of released contaminants," not "protect against migration of released contaminants".

II.B. Response

The drums containing high concentrations of organic material were found in test pits dug in areas of high magnetometer readings in the landfill. Under the selected remedy, Alternative SRCVT, drummed wastes in these areas will be removed from the landfill. The remainder of the landfill will be capped and contained using a soil-bentonite slurry wall keyed into the underlying clay layer. Long-term monitoring of the groundwater around the containment system is also a component of the selected remedy. Groundwater monitoring should signal a release of contaminants to the groundwater out side the containment system in the event of component failure.

The design of the alternative components as presented in the report is adequate for consideration as a remedial action alternative in an FS. Design details, such as those requested in the comment will be addressed during the remedial design. The slurry wall's extraction system will be designed to maintain a negative head within the slurry wall to keep any contaminant releases away from the wall. Placement of the extraction wells within the containment system will consider the irregularities in the clay surface to minimize ponding and pooling of liquids on its surface. Special admixtures may be considered for use in the slurry wall design that promote flocculation and swelling of the bentonite mixture, reducing the permeability of the wall in the presence of aqueous organics. The components of Alternative SRCVT reduce the risks associated with wastes in the landfill by removal of a principal threat (drummed materials in areas of high magnetometer readings), secure containment of remaining wastes, (cap, slurry wall extraction system) and long-term groundwater monitoring around the entire engineered system.

II. C. Comment

Additional waste characterization should be done to locate and quantify the drummed bulk waste in the landfill to complete a proper design of the landfill remedy. As currently presented, the Proposed Plan calls for excavation of only 0.8 acres of an 11 acre landfill. This estimate is based on a remedial investigation (RI) waste characterization designed only to collect qualitative information on the nature of drummed and bulk wastes in the landfill.

1. The lack of additional waste characterization in the landfill might allow concentrated wastes to be missed. Any remaining concentrated wastes would have a high likelihood of penetrating the vertical wall barrier. Adequate source removal is imperative.

2. The estimated cost of the additional waste characterization is approximately $100,000-$250,000 or approximately one percent or less of the total cost of Alternative SRCVT.

3. U.S. EPA does not wish to characterize at a relatively low cost, the remaining portions of the seven acres of magnetic anomalies to determine where drum concentrations are located.

4. The statement in the FS, "The intent of the (landfill pit) investigation was not to fully establish the nature and extent of contamination..." is fully supported.

5. Magnetometer - gradiometer data have limitations in identifying locations of drums. They identify ferro-magnetic objects, which may or may not be drums. The lack of a significant magnetometer anomaly does not necessarily indicate that quantities of drums are not present. The drums in a small magnetic anomaly may be more deeply buried than drums in a large magnetic anomaly since depth of burial is a significant factor in the size of an anomaly. Drums, furthermore, may even be of non-ferrous materials. U.S. EPA plans to excavate the centers of high magnetic anomalies as the complete drum removal in Alternative SRCVT.

6. The FS used RI landfill test pit waste characterization data to cost out a removal option and therefore misused information gained from the landfill test pit data. The test pits were not intended to provide volume estimates of the number and types of drums in the landfill.

7. Based on information collected in the RI, it is likely that up to seven acres of the eleven acre landfill contain high concentrations of drummed waste.

investigated in the form of test pits are not known but are assumed to be much lower than those in areas of high magnetometer anomalies. Alternative RDN would remove all waste materials from the landfill including all drums encountered during excavation. Since areas outside of those with high magnetometer readings will be excavated, additional drums may be encountered, although the number of additional drums is assumed to be small and not have a significant impact on the cost of the alternative.

The additional risk reduction from implementing this alternative instead of SRCVT is a result of removal of all contaminated materials from their uncontrolled situation and either treatment (in the case of drummed materials) or secure containment in an onsite RCRA-type landfill.

The waste volume estimate assumptions for Alternatives RD and RTD are presented in Appendix F. (This appendix summarizes all available information regarding waste types and volumes at the site in the form of interviews, phone calls, file records, and documents from the U.S. EPA and MDNR). After excavation, the former landfill will either be filled in with clean fill material, graded, and revegetated or will be used to facilitate an onsite RCRA-type landfill.

A clean closure remedial action returns a site to near original conditions, such that constituent residuals are no longer a threat to public health and the environment. The only Forest Waste alternative that could be considered "clean closure" is the RDF alternative with offsite disposal (Alternative RDF, presented in Chapter 5).

II.H. Comment

The contaminated groundwater at this site should be characterized as waste, not hazardous waste on page 4-9, "bullet" 2 of the FS. There is nothing to indicate that the contaminated groundwater is a RCRA hazardous waste.

II.H. Response

U.S. EPA agrees with this comment.

The contaminated groundwater at Forest Waste contains low levels of hazardous substances. Since the source of this contamination (the onsite lagoon waste) is not a documented RCRA listed waste, and the contaminated groundwater does not display any RCRA characteristics, and the contaminated groundwater is not waste product from a Superfund site, the groundwater should not be characterized as a hazardous waste. Page 4-9 of the FS, which describes the groundwater as a hazardous waste is not correct. A licensed hazardous waste hauler would not have to transport this groundwater if it were transported offsite.

II.I Comment

Comment on long-term operations and maintenance (O&M).

1. Who is responsible for long term maintenance of any landfill remedy into perpetuity?

2. Who pays for 5-year reviews?

3. What is the definition of the long-term maintenance cost (page 5-1 of the FS)?

4. The O&M costs of Alternatives SRCV and SRCVT in the FS are very low.

5. The present-worth cost analysis distorts the true cost of long-term O&M for Alternatives SRCV and SRCVT, which the State would have to pay.

6. Periodic replacement and repair of the slurry wall will be needed.

7. The annual O&M cost estimate and present worth of O&M for groundwater Alternative SR do not accurately reflect the "True Cost" of groundwater monitoring. The monitoring for the groundwater in Alternative SR would be for an indefinite period of time.

II.I. Response

As recognized by the commenter, the State of Michigan is responsible for long-term operations and maintenance (O&M) of the landfill if no responsible party assumes this responsibility. If, under a consent agreement, or unilateral enforcement action, responsible parties conduct the O&M actions, then the State of Michigan will not need to do them. In a similar fashion, the State or responsible parties conduct and pay for the five year reviews.

Long term maintenance costs cited on page 5-1 of the FS refer to the costs of maintaining the waste management system over time once it is constructed. In Alternative SRCVT, for example, that would include maintenance of the cap and slurry wall and operation of the dewatering system and monitoring system.

The commenter charges that the O&M costs presented in the FS for Alternatives SRCV and SRCVT are low and distort the two costs. Per U.S. EPA guidance, costs for all remedies were calculated over a 30 year period, using a present worth analysis with a 10 percent discount rate and no cost adjustments for inflation. (See page 1-2 of the FS). Such present worth analysis allows for cost comparison of all alternatives with varying degrees of O&M. O&M costs for greater than 30 years are recognized, but not calculated in FS analyses. The O&M costs for Alternatives SRCV and SRCVT were calculated in this fashion, accounting for long term costs of the cap, landfill dewatering collection system and water treatment, and groundwater monitoring. Repair and replacement of the slurry wall was not calculated because it should not be needed within 30 years. U.S. EPA recognizes the limitations of this present worth cost analysis, but believes it is useful and applies it in all Superfund FS cost analyses.

The costs for groundwater Alternative SR were calculated per U.S. EPA guidance as described above. While the length of time for this monitoring is currently unknown, it will not be endless. Since the source of this groundwater contamination will be completely removed in the lagoon operable unit cleanup, the levels of contamination in the groundwater will eventually drop to a point where monitoring is no longer needed.

II.J. Comment

The analysis to consider the potential for future remedial action costs in the case of remedial action failure was not done on the FS. This analysis is required by CERCLA Section 121(b).

II.J. Response

The requirement in CERCLA 121(b)(1)(f) is that, as alternatives are assessed in the remedy selection process, consideration be given to "the potential for future remedial action costs if the remedial action in question were to fail". The potential for future costs is discussed in the FS in the implementability, technical feasibility, reliability discussion on Table 5-5. The less reliable an alternative is in performing over time, the higher the potential for future remedial action costs. This reliability discussion is more fully developed in the ROD. This evaluation does not require that specific cost estimates be developed as "future remedial costs". Such costs estimates would require so many assumptions that they would serve no useful purpose.

II.K. Comment

The MDNR cannot concur with the U.S. EPA recommended groundwater Alternative SR. Ronald Willson and the Michigan Department of Public Health also do not support the U.S. EPA recommended groundwater alternative.

1. Groundwater quality on the Forest Waste Disposal site has been adversely affected and cannot be fully utilized in its currently degraded condition.

2. Recent data collected by MDNR show that the MCL for trichloroethene was again exceeded (beyond the one time in the RI field work) with a value of 5.5 ug/l from a well at the eastern site boundary. Since these data indicate that the remedial action goals have been exceeded at the site boundary, a plan for further groundwater remedial action should be developed as described in the Proposed Plan. The MDNR data were collected subsequent to the start of the comment period on the FS and Proposed Plan.

3. The new data also exceed MCLGs and proposed MCLGs. An excess cancer risk of 10^{-6} was also exceeded.

4. The U.S. EPA recommended groundwater Alternative SR would allow further degradation of groundwater downgradient of the contaminated plume, and eventually discharge contamination to surface water. This concept of cross

media transfer is contrary to MDNR efforts to remediate sites where contaminated groundwater vent to other media. This violates Part 22 of Michigan's Water Resources Commission Act which prohibits degradation of State groundwater because by not performing groundwater cleanup, further degradation of groundwater downgradient of the contaminant plume will occur.

5. The Michigan Department of Public Health (MDPH) commented that supplying Maximum Contaminant Levels (MCLs) in groundwater contamination situations is a new approach by U.S. EPA, and expressed some concerns about this approach. The MCLs have been developed to describe clean water with regard to a single contaminant, not to describe when waste water or contaminated water with potentially several contaminants present might be safe to drink.

The MDPH is concerned with applying MCLs to drinking water from domestic wells. The policy of MDPH is that the presence of environmental contaminants in domestic wells in unacceptable. Presence of contaminants in water wells would result in the MDPH issuing health advisories to those affected areas.

6. MDNR prefers Alternative CTGD for the groundwater.

7. The FS does not indicate (page 4-14) that the groundwater Alternative SR does not meet the remediation goals. Specifically, a Maximum Concentration Level (MCL) is exceeded in a drinking water aquifer and the Part 22 nondegradation policy of Act 245 (Water Resources Commission Act) is not complied with.

II.K. Response

U.S. EPA recognizes the MDNR reservations about selection of Alternative SR for the groundwater. However, U.S. EPA, maintains that Alternative SR is a cost-effective alternative that provides adequate public health and environmental protection. The Agency agrees that onsite shallow groundwater should not be used as a drinking water source. U.S. EPA, recognizes that an RI data point indicates trichloroethene exceeded the MCL onsite. The deed restrictions component of this remedy will prevent onsite groundwater use as drinking water, thus providing adequate protection and assuring compliance with the Safe Drinking Water Act ARAR.

The monitoring component, and trigger for further action, will assure that unacceptable levels of contaminants will not migrate offsite.

The specific remedial action goals for groundwater at the site are stated on page 2-4 of the FS. U.S. EPA has not limited the goals to attainment of MCLs in the groundwater but has included other health advisories, the 10^{-4} to 10^{-7} cancer risk range, and goals for surface water protection in light of Ambient Water Quality Criteria. U.S. EPA, recognizing the MDPH comment that MCLs have been developed to describe clean water with regard to a single contaminant, has included other health advisories and the cancer risk range as cleanup goals. It should be noted that this groundwater cleanup Alternative SR is for a drinking water aquifer that could be, but is not currently, used as a drinking water supply source. This alternative is not for application to current use domestic wells. The domestic wells in the area have been shown, via modelling, to be well protected against migration of site contaminants.

MCLGs and the Part 22 of Michigan Water Resources Commissions Act (Act 245) non-degradation policy are not groundwater cleanup goals at the site. As is current U.S. EPA policy, MCLs, as opposed to MCLGs, are generally the relevant and appropriate standard for Superfund groundwater cleanups (See letter to Honorable James J. Florio from Lee M. Thomas, Administrator of U.S. EPA, May 21, 1987). Act 245 is not an ARAR for groundwater. See Response to Comment II.M.4.

The new data submitted by the State has been reviewed and considered. A complete package of the data analysis, including quality control/quality assurance information was not, however, provided. Several compounds were identified on the data summary as "Compound identity not confirmed by second independent technique", including the offsite detection of 1,1, dichloroethane. The quality of these data is not known and is questionable.

Assuming nonetheless, that the data is accurate, it does not provide information that groundwater Alternative SR is not protective or does not meet ARARs.

The cost and implementability factors of Alternative CTGD make it a less attractive alternative for selection than Alternative SR.

II.L. Comment

There are concerns about contaminated groundwater discharging to the surface waters east of the site.

1. The recent MDNR sampling detected low level organics in offsite wells located directly in the wetland east of the site, which drains into Butternut Creek.

2. The recent data indicate that groundwater is moving faster than previously thought.

3. Additional monitoring wells downgradient of detected offsite contamination must be installed to adequately monitor the groundwater and assure that surface water Ambient Water Quality Criteria are not being exceeded.

4. The data which indicate that low level organics have been detected in offsite wells located directly in the wetlands suggest the modelling on contaminant flow to surface water (done in the FS) is incorrect. This modelling suggested offsite surface water bodies will not be adversely affected by migration of groundwater contaminants. Surface water has already been adversely affected by migration of onsite groundwater.

II.L. Response

The MDNR groundwater data submitted to the U.S. EPA on February 26, 1988, have not been reviewed for quality control methods used during sampling and analysis. Such quality control information has not been submitted to U.S. EPA by MDNR. Without this review the validity of the data is questionable.

Assuming the data are acceptable for use in evaluating groundwater quality, the organic concentrations detected in the offsite monitoring well (2.0 ug/l cis-1,2-dichloroethene and 1.8 ug/l 1,1-dichloroethane) are well below the MCLG (70 ug/l) for cis-1,2-dichloroethene and calculated health advisory concentration (4200 ug/l, based on reference dose) for 1,1,dicloroethane. The concentrations detected in the onsite wells were generally below those detected in the wells during the RI sampling efforts for which a full risk assessment had been performed.

The current placement of offsite monitoring wells for use in the long-term monitoring program is adequate to monitor site groundwater migrating to the east. The monitoring performed in the selected remedy will be used to evaluate changes in groundwater quality resulting from migrating contaminants. Monitoring requires that if such significant changes occur, additional remedial action on the groundwater will be evaluated.

The U.S. EPA realizes the crudeness of the groundwater model used and presented in Appendix C-3. The purpose of the model was to estimate the concentrations of certain chemical constituents in the groundwater discharging to the wetlands and to compare these estimated concentrations to Federal and State limits. This information was used by U.S. EPA to help evaluate the groundwater alternatives in the FS. The limitations and assumptions of the model are clearly presented in the Appendix C-3 discussion.

II.M. Comments on Applicable or Relevant and Appropriate Regulations (ARARS)

II.M.1. Comment

It is speculative that landfill Alternatives NA, SR, and SRC comply with the Safe Drinking Water Act (SDWA).

II.M.1. Response

Currently the groundwater, including shallow aquifer groundwater, has not been impacted by landfill contaminants. Currently, therefore, groundwater quality around the landfill is less than SDWA Maximum Contaminant Levels (MCLs). In landfill Alternative NA, long-term compliance with the SDWA would not be known, because potential future releases of landfill wastes to the groundwater would not be identified. In landfill Alternatives SR and SRC, however, potential future releases of landfill waste to the groundwater could be identified via the monitoring component of these alternatives. Once such releases are identified a plan to remediate such releases would be evaluated to assure compliance with the SDWA. In this sense, landfill Alternatives SR and SRC comply with the SDWA.

II.M.2. Comment

Landfill Alternatives NA, SR, and SRC would not comply with Michigan Act 641 of 1978 as amended (Michigan Solid Waste Management Act).

II.M.2 Response

Michigan Act 641 of 1978 was designed to regulate and manage solid waste, not hazardous waste regulated by other statutes. This Act is less stringent than RCRA, which is an ARAR, and therefore is not an ARAR at this site. U.S. EPA agrees that these alternatives do not comply with RCRA.

II.M.3. Comment

Landfill Alternatives NA, SR, and SRC would not be in compliance with the Part 22 Groundwater Rules of Act 245 of 1929, because with these alternatives, groundwater would undoubtedly be impacted and degraded, contrary to these rules.

II.M.3. Response

Part 22 Groundwater Rules of Act 245 is not an ARAR at this site. Part 22 prohibits degradation of Michigan's water quality. Part 22 defines degradation as any change above background which is determined by the Water Resources Commission to be a deterioration of groundwater quality. The purpose of Part 22 is to prevent discharges into the groundwater. U.S. EPA is not discharging into the groundwater of Michigan, it is proposing a cleanup action. Hence, these rules are not applicable to the groundwater cleanup action.

Part 22 is not relevant and appropriate to establishing cleanup levels at the site. There are no promulgated regulations that serve as cleanup standards within the Act or the Rules. Also, the objectives of these rules is to prevent a deterioration of groundwater through degradation. Part 22 provides for nondegradation of groundwater quality in usable aquifers, defines the requirements for hydrogeological study before permitting a discharge into groundwater, establishes groundwater monitoring requirements for new and existing groundwater discharge and establishes a procedure for obtaining variances from these rules. The objectives of these rules, which are to define and limit discharges into groundwater, vary significantly from the objectives of the remedial activity proposed by U.S.EPA at this site, which are to control an existing hazardous waste site, and are therefore, not relevant and appropriate. For further discussion of this issue see Kelley v Chemcentral/Grand Rapids, No. 80-30139-CE State of Michigan, Circuit Court of Kent County, (May 3, 1984).

II.M.4. Comment

In landfill Alternatives SRCV and SRCVT, the Federal RCRA Land Ban Restrictions prohibiting placement of regulated liquids in an landfill would be "relevant and appropriate". These alternatives do not comply with the Federal RCRA Land Band ARAR.

II.M.4 Response

Landfill Alternatives SRCV and SRCVT comply with the Federal Land Ban. The Land Ban prohibits the land disposal of regulated liquid wastes in landfills. It is designed to preclude the placement of liquid waste in landfills after November 1986. Alternative SRCV does not require placement of liquid wastes in a landfill. Alternative SRCVT includes the excavation of wastes, thermal destruction of all excavated waste, and proper disposal of the waste residue. No liquid waste will be land disposed with either Alternative SRCV or SRCVT, so they both comply with the Land Ban.

II.M.5. Comment

In landfill Alternatives SRCV and SRCVT, the in place waste containment component of these remedies would not provide for a double lined system for placement of hazardous waste. Use of a double liner in these alternatives is relevant and appropriate under Michigan's Hazardous Waste Management Act, and RCRA. Since these alternatives do not provide for a double liner, they do not comply with the Michigan Hazardous Waste Management Act (Act 64 of 1979).

II.M.5. Response

Landfill Alternatives SRCV and SRCVT outline in-place closure of the landfill. RCRA is relevant and appropriate for both these alternatives. RCRA does not require the use of the double-lined system for placement of hazardous waste when final closure is implemented. See 40 CFR Section 264.310. Michigan Act 64 adopts by reference 40 CFR Section 264 Subpart N (including 40 CFR Section 264.310) at Michigan Admin. Code R. 299.11003(j). Since Alternatives SRCV and SRCVT require closure pursuant to Subpart N, they meet the requirements of both RCRA and Act 64.

II.M.6. Comment

Groundwater Alternatives NA and SR do not comply with the State of Michigan Surface Water Quality Guideline Levels for Protection of Aquatic Life and the Federal Ambient Water Quality Criteria for the Protection of Freshwater Aquatic life ARARs, since contaminant transport modelling indicates levels of cyanide 500 feet from the site (in the nearest surface water body) exceed these guidelines.

II.M.6. Response

U.S EPA believes that, to date, no information indicates that release of site contaminants in excess of Federal Ambient Water Quality Criteria or State of Michigan Surface Water Quality Guideline Levels for Protection of Aquatic Life have migrated to the nearest surface water body. Groundwater contaminant transport modelling, presented in Appendix C, Page C-4 of the U.S. EPA FS, furthermore, indicates that current concentrations of onsite groundwater contaminants should not exceed the Federal AWQC or State of Michigan Guidelines as they discharge to the nearest surface water body. When the maximum current onsite groundwater contaminant concentration for cyanide is used in this modelling, the modelling indicates standards for cyanide may be exceeded in the nearest surface water body. However, when the mean concentration detected in cyanide analyses are used in the modelling, the modelling indicates standards for cyanide will not be exceeded. U.S. EPA believes that the contaminant modelling using mean contaminant concentrations is a better method to predict discharge contaminant concentrations to the nearest surface water body. U.S. EPA, therefore, believes that over time the ARARs for regulation of the nearby surface water quality will be met with groundwater Alternative SR.

More importantly, however, groundwater Alternative SR is configured so that if the predictive modelling was not accurate and the monitoring program indicates surface water standards will be exceeded as groundwater discharges to the nearest surface water body, a plan for further groundwater remedial action will be evaluated. Federal AWQC and State Surface Water Guidelines will be complied with in groundwater Alternative SR. Since monitoring data is not collected in Alternative NA, compliance with surface water ARARs will be unknown.

II.M.7. Comment

Groundwater Alternatives NA and SR do not comply with the Safe Drinking Water Act because the MCL for trichloroethane has been exceeded onsite.

II.M.7. Response

Currently offsite there are no releases of contaminants to the groundwater in excess of SDWA MCLs. RI data has indicated that only one sample of groundwater from onsite has concentrations that exceed SDWA MCLs. Although data collected by MDNR subsequent to the RI indicates another sample of onsite groundwater exceeds SDWA MCLs, the quality of this data is unknown. (See Response to Comment II.K.)

The onsite groundwater will not be used as a drinking water source. The deed restrictions component of Alternative SR will prevent this from happening. The groundwater monitoring component of Alternative SR will, furthermore, identify if offsite releases of groundwater contaminants in excess of SDWA MCLs will occur. If such releases offsite are likely to occur, a plan for further groundwater remedial action will be evaluated. Alternative SR assures that groundwater with contaminant concentration in excess of MCLs will not be used as a drinking water source, and therefore

101

complies with the SDWA. Alternative NA makes no such assurances, and therefore does not comply with the SDWA.

II.M.8. Comment

Groundwater Alternatives NA and SR do not comply with the Michigan Water Resources Commission Act (Act 245 of 1929) because uncontrolled continued migration of groundwater contamination would allow impact of previously uncontaminated groundwaters to the State, degrading the groundwater. Part 22 of this Act provides for nondegradation of groundwater quality in usable aquifers.

II.M.8. Response

Part 22 of Act 245 of 1929 is not an ARAR at this site. See discussion at response to Comment II.M.3.

II.M.9. Comment

If a release from the remaining landfill wastes to the environment occurs after the partial drum removal in Alternative SRCVT is performed, Alternative SRCVT would not comply with the Part 22 Groundwater Rules of Act 245 of 1929 as amended (Water Resources Commission Act). These rules prohibit the degradation of the State's groundwater.

II.M.9. Response

Part 22 of Act 245 of 1929 is not an ARAR at this site. See discussion at response to Comment II.M.3.

II.N. Comment

Comment on the deed restrictions of groundwater Alternative SR.

1. The deed restrictions component of groundwater Alternative SR should include restrictions for installing a drinking water well in any aquifer in the restricted area, not just the shallow aquifer. This will prevent cross contamination from the shallow aquifer to deeper aquifers during drilling.

2. The deed restrictions must extend to onsite and affected offsite areas from shallow aquifer contamination.

3. Deed restrictions require the cooperation of affected property owners, not just the local government.

II.N. Response

The comment made that deed restrictions in groundwater Alternative SR should include restrictions to install drinking water wells in any aquifer in the restricted area, not just the shallow aquifer, is valid. The comment will be incorporated into the selected remedy.

The deed restrictions component of groundwater Alternative SR is most vital to the onsite areas. If remedial action goals are exceeded at the onsite boundary, a plan for further groundwater action will be evaluated. The onsite deed restrictions component will be easily enforced because the State of Michigan owns the site property, and can be depended upon to assure enforcement by the deed restrictions. Cooperation of the onsite local property owners should also be easily gained.

The deed restrictions component of groundwater Alternative SR does extend to adjacent site areas (see page 4-23 of FS), although such component of the remedy is not as important as the onsite deed restrictions component because the remedy is configured so that these offsite areas will not become contaminated. This component of the alternative is precautionary and not vital for protection of human health and the environment. U.S. EPA recognizes that cooperation of adjacent property owners will be needed and anticipates their cooperation.

II.O Comment

The fourth paragraph of Part IV, Scope of the Feasibility Study, on page 4 of the Proposed Plan states that the shallow aquifer east of the landfill is contaminated. While this is true, the contaminated groundwater is immediately east of the lagoons. The lagoons are the suspected source of groundwater contamination.

II.O. Response

The referenced statement (Proposed Plan, page 4, part IV, fourth paragraph, risk sentence) should read, "The shallow aquifer east of the lagoons appears to have been affected by site contaminants". The RI data indicate and the FS maintains that the source of this contamination is from the lagoons on the east half of the site.

II.P. Comment

1. Assuming the modelling in the FS is correct, no domestic water supply wells will be adversely affected by the movement of the groundwater contaminant plume. However, in case the modelling is erroneous or the plume does not behave as expected, an option should be included in the final remedy to provide alternative drinking water supplies, should the need arise.

2. The FS Report does not include any provision for periodic sampling of domestic water wells near the Forest Waste Disposal site. If the site monitoring should indicate a release of contaminants, it is requested that the MDPH Groundwater Quality Control Section staff be notified promptly.

II.P. Response

The selected groundwater Alternative SR is configured such that if the contaminant plume does not behave as expected, and the quality of offsite groundwater will exceed the groundwater remedial actions goals, a remedial action plan to clean up the groundwater will be evaluated. If at any time there is suspicion that domestic water supply wells may be adversely affected by movement of the groundwater contaminant plume, alternative drinking water supplies will be seriously considered as part of a future remedial action plan. The MDPH Groundwater Quality Control Section staff will be promptly notified if groundwater contamination above the remedial action goals is detected offsite.

II.Q. Comment

Air Issues:

1. During removal of drums in the Alternative SRCVT, ambient air monitoring for VOCs will be required.

2. If an onsite RCRA landfill is constructed, ambient air monitoring for VOCs will also be required during disposal of waste in an onsite landfill.

3. In the cases of an onsite RCRA landfill or a slurry wall, TSP monitoring and dust control measures will be required. VOC monitoring of the landfill vents will be required after they have been installed.

4. Dust suppression may be needed for Farrand Road if heavy vehicle traffic is expected.

5. In executing cleanup activities at the site, there must be compliance with Rule 901 of Act 348 (State of Michigan).

6. MDNR requests a review of the cleanup work plan to determine the adequacy of the air monitoring program and control measures. A plan must provide for immediate data on total VOCs and a separate portion to determine the levels of specific compounds at the property line.

7. Given the isolation of the site, TSP Monitoring using high volume samplers is not necessary. Monitoring using a portable, instantaneous readout instrument will be acceptable.

8. The U.S. EPA selected alternative for the groundwater will likely not have any significant impact on air quality.

9. It may be necessary to provide treatment of any gas collected in a landfill gas collection system.

II.Q. Response

Ambient air monitoring and air quality monitoring will be performed during all remedial actions to evaluate exposure risk to workers and nearby offsite residents. Air monitoring of any onsite treatment or disposal facilities will be performed as routine operation and maintenance of that facility. Compliance with all Federal and State air quality laws is recognized as an ARAR for the site as shown in Tables 5-7 and 6-4 and as discussed in the Forest Waste ROD. Comments 8 and 9 are recognized. As appropriate, MDNR will be offered the opportunity to review the cleanup work plan.

II.R. Comment

Property Compensation:

1. Groundwater Alternative SR is going to require the affected property owners be compensated for deed restrictions and long-term use monitoring wells on their property.

2. Groundwater Alternatives CTGD and CTP will require compensation of affected property owners for use of their property to operate the groundwater collection and treatment systems necessary.

II.R. Response

It is the U.S. EPA's position that restrictions and/or activities designed to protect human health or the environment are valid exercises of its authority and do not constitute a taking.

II.T. Comment

MDNR commented that there were a number of substantial differences between the Agency Review Draft of the FS and the Public Comment FS, and that such changes require a reevaluation of the various alternatives, and more than a cursory review of the document.

1. What new information prompted the change in the number of estimated drums in the Agency Review Draft from 1000 drums to 4000 drums in the Public Comment Draft FS?

2. Between Agency Review Draft and Public Comment Draft, the soil and landfill contents quantity changed from 247,000 to 208,000 cubic yards. Between drafts, the cost of treatment and disposal of bulk solids, bulk solids with PCBs, and drummed solids dropped from $30,000,000 to $12,800,000.

II.T. Response

Changes to the Agency Review Draft FS were made in response to comments made by the U.S. EPA and MDNR during the review period and because of further evaluation of existing data and information about the site.

No "new" information was obtained regarding the number of drums in the landfill. It has been reported in the file (Task Technical Memorandum No. 3 - Technical Memorandum of Magnetometer Survey, October 28, 1985) that 1,000-3,000 drums were disposed of in the landfill. The 1,000 number was used in the draft FS report. The revised number (4,000) was calculated using actual field data from the test pit investigation and magnetometer

105

surveys. Because the drum quantity became a larger issue during the review period, closer examination of this number was warranted. Likewise, revisions to the volume of bulk wastes in the landfill were made after closer examination of the site information regarding disposal areas and depths gathered during the field efforts.

The discrepancy noted in Comment II.T. refers to the present worth order-of-magnitude cost for RCRA disposal of bulk solids from the landfill reported as $30,000,000 in the Agency Review Draft FS and $12,800,000 in the Public Comment FS report. A calculation error was discovered during the review period which prompted the revised cost.

II.U. Comment

Comments on longer-term residual risk of landfill Alternatives SR and SRC:

1. The long-term future risk potential in landfill Alternative SR is not reduced by groundwater monitoring as stated in Table 5-4 of the FS. Risk reduction would only occur if additional remedial measures were implemented as a result of groundwater monitoring.

2. Why does Table 5-4 of the FS state that "Risk due to future potential releases in the landfill are not reduced" in Alternative SRC, but "Future risk potential is reduced through groundwater monitoring" in Alternative SR? Alternative SR is less protective than Alternative SRC.

3. Landfill Alternatives SR and SRC should not be described as providing any future risk reduction to groundwater through contaminant leaching on Table 5-4 of the FS.

II.U. Response

To clarify statements made in Table 5-4 regarding the long-term residual risk associated with landfill Alternatives SR and SRC:

The potential for future releases of contaminants in the landfill and migration to groundwater is the same for both Alternatives SR and SRC since there is no remedial action on the landfill that prevents releases. However, future risks to public health with future use scenarios from releases are reduced through groundwater monitoring in both alternatives. The statement made regarding future risks to groundwater through contaminant leaching is correct and recognized in this response. Installation of a groundwater monitoring program requires that future remedial action will be evaluated if such a release is detected by the monitoring.

II.V. Comment

The cost of Alternative SRCVT in the FS ($22,530,000) is incorrect. This cost is based on an estimate for the number of drums in the landfill which is based on incomplete information.

1. The U.S. EPA contractor CH2M Hill developed a cost range for various areas of drum removal up to 7 acres. This range of cost was $22,530,000 - $28,467,000.

2. The range of costs developed for the different sizes of landfill acreage to be excavated must be explained so that the public can adequately evaluate Alternative SRCVT.

II.V. Response

The number of drums used as a basis for the Alternative SRCVT cost estimate uses all available information regarding reported number of drums disposed of at the site, areas of concentrated drums disposal based on the magnetometer surveys, and drum densities determined from the RI test pit investigation. The degree of confidence in this estimate is sufficient for use as a basis for an FS cost estimate.

The order-of-magnitude cost in present-worth dollars of Alternative SRCVT is $22,530,000. This estimate is accurate within +50% to -30% of this cost and is based on the assumption made from available information at the time of the FS. Therefore, the range of costs for this Alternative is $15,771,000 to $33,795,000. The range presented in Comment II.V. ($22,530,000 to $28,467,000) is a misinterpretation of a draft cost figure generated by U.S. EPA's contractor, submitted to U.S. EPA and MDNR on 1-20-88. The figure was intended to illustrate the cost relationships between alternatives SRCV, SRCVT, and RDN. The cost figure shows that as larger areas of the landfill are excavated, beyond the areas of highly concentrated drum disposal, the cost of Alternative SRCVT quickly approaches that of the complete removal Alternative RDN. The only interpretation that should be made from this draft figure is that if significantly larger areas of the landfill require excavation and drum removal based on more complete and detailed information generated during the remedial design at the site, the cost effectiveness of the SRCVT alternative should be reevaluated.

II.W. Comment

Appendix E, "Detailed Cost Estimate", is confusing. It is unclear from this Appendix how the costs for each individual alternative were developed.

1. Are the costs for materials excavation in the options presented in Table 5-3 constant?

II.W. Response

Several of the remedial technologies presented in this FS are used in more than one alternative. For this reason, Appendix E detailed cost tables are organized by remedial technology rather than by alternative. The advantage of this is in having the reader evaluate the costs for a technology once on one specific table, instead of on each alternative cost table on which it would appear. As explained on pages 5-10 and 6-2, costs for an alternative are obtained by adding the specific cost of the individual technologies appropriate to the alternative. The components or technologies used in each alternative are listed for each alternative on Table 5-6 (soil and landfill contents) and 6-3 (groundwater).

The treatment and disposal costs for the soil and landfill contents presented in Table 5-3 are based on complete removal of all landfill wastes. Therefore, excavation costs are constant for each option ($12,693,000, see Appendix E detailed cost table).

II.X. Comment

MDNR and Ron Willson comment that they believe U.S. EPA has not complied with the spirit or content of CERCLA Section 121(f) concerning State involvement. MDNR believes they have not had meaningful involvement in selection of remedial actions to be undertaken in their State. They believe they were not afforded a reasonable opportunity to comment on the Feasibility Study.

1. The State had no opportunity to provide comments on the Public Review Draft FS prior to U.S. EPA's development of their Proposed Plan, because they received the Proposed Plan prior to receipt of the Public Comment Draft FS.

2. A decision by U.S. EPA to propose Alternative SRCVT was made before the Public Comment Draft FS was finished and current cost information was available. When cost information was available, it was not objectively evaluated using criteria of effectiveness, implementability, and cost. "The costs which are used do not match the effectiveness claimed by this document." (page 6 of January 28, 1988 memo from Kathy Shirey to Brian Monroe).

II.X. Response

U.S. EPA strongly disagrees with the MDNR and Ron Willson comment that the State of Michigan has not had meaningful involvement in selection of remedial actions to be undertaken at Forest Waste, and that the State was not afforded a reasonable opportunity to comment on the Feasibility Study.

The schedule for the FS was developed in conjunction with MDNR representatives, and agreed upon by both U.S. EPA and MDNR in spring 1987. This schedule included FS milestone deliverables, Agency review periods for deliverables, and interim meeting dates. The schedule was successfully executed and included intense and frequent involvement with MDNR representatives. A summary of the formal milestone involvement points follows. Weekly/daily telephone communication between the State and U.S. EPA took place during the entire FS development period.

The State was afforded the opportunity to review and comment on a technologies screening, remedial action goals, and rough ARARs FS deliverable in late May 1987. On May 29, 1987, these deliverables were discussed in a meeting with MDNR, U.S. EPA, and U.S. EPA consultant representatives. The State's comments were incorporated to their satisfaction.

The State was afforded the opportunity to review and comment on an alternatives development FS deliverable in mid-September 1987. This deliverable and potential State ARARs were discussed in a meeting with MDNR, U.S. EPA, and U.S. EPA consultant personnel on September 23, 1987. The State comments were incorporated to their satisfaction.

An official request for ARARs identification for the current assembled alternatives at Forest Waste was sent to the State on October 5, 1987. A response to this request was received within approximately 30 days, and incorporated into the FS.

The Agency review draft of the FS, December 2, 1987, was sent to the State for comment and review. Comments were received in early January 1988 and incorporated into the Public Comment Draft FS. A final meeting to discuss these comments was held with MDNR, U.S. EPA, and U.S. EPA consultant personnel in January 5, 1987. At this meeting potential remedy selection options were discussed in depth. U.S. EPA made clear what their preferred alternative was at that time.

Concurrent with the Public Comment Draft FS, MDNR was provided a copy of the draft Proposed Plan for the site on January 20, 1988. On January 21, 1988, a letter was received from the State strongly opposing the recommended alternatives for selection in the Proposed Plan. Intense discussions between U.S. EPA and MDNR persisted for several days. Immediately prior to the release of the Proposed Plan was the first communication that the State made to U.S. EPA claiming a lack of meaningful involvement. On January 29, 1988, the Proposed Plan was released for public comment, incorporating to the extent possible the State comments and identifying the State concerns. The Proposed Plan recommendations were carefully considered by U.S. EPA using the final information about all alternatives developed in the FS, including final cost information, prior to its release.

U.S. EPA feels that they made every effort to involve the State in the FS development and remedy selection process and that these efforts were successful. While we recognize and regret that the State does not support our selected remedy, this fact does not constitute a denial of State involvement in these processes.

II.Y. Comment

Editorial Remarks

1. The last sentence on page 1-8 of the FS, "Observations during the landfill investigation suggest that localized perched water zones exist in the landfill area", should add at its end, "rather than a continuous, uniform groundwater mound".

2. The FS should clarify on page 1-12, first sentence, that some nearby residential wells are in the drift aquifers.

3. The FS should clarify on page 4-12 that while a cap and slurry wall reduces contaminant mobility, such a reduction does not come through treatment of the hazardous waste but rather through containment.

4. "GAC" should not be abbreviated in the FS.

5. "12 mg" should be spelled out in the FS.

II.Y. Response

Y.1. The editorial comment is correct and recognized.

Y.2. Complete information regarding well screen depths for all area drinking water wells was not available at the time of the report. Therefore, the possibility exists that some residential drinking water wells near the site are screened in the upper sand and gravel aquifer, referred to as the "shallow aquifer".

Y.3. The editorial comment is correct and recognized.

Y.4. The definition of GAC is given on page 4-7. This abbreviation is well known and acceptable for use in referring to "granular activated carbon" systems. The abbreviation is used to condense the otherwise wordier-text.

Y.5. The second sentence on page 4-7 should read, "The plume volume of 12 million gallons (MG) is estimated based...".

II.Z. Comment

Bulk wastes containing dioxin at Forest Waste may not be accepted by some RCRA facilities, even though dioxin concentrations in this waste is so low, disposal of the waste is not banned by law. This is an implementability issue for any alternative where land disposal of this waste is considered.

II.Z. Response

This potential implementability issue for the low level dioxin contaminated wastes in the landfill was not identified in the FS. This issue has been considered by U.S. EPA in remedy selection for the landfill and is recognized in the ROD. This issue makes the landfill Alternative RDF, the only alternative that would provide for offsite disposal of this waste, less attractive for selection. Alternative RDF is not the selected landfill remedial action.

II.AA. Comment

In groundwater Alternative CTGD, it may be necessary to provide additional treatment for the metals in the GAC system proposed for groundwater treatment before water is discharged to Butternut Creek.

II.AA. Response

This stipulation regarding additional unit processes in treating the site groundwater to the required quality (NPDES limits) prior to discharge is clearly made in the onsite groundwater treatment summary discussion on page

3-19 and is re-emphasized in the detailed description of Alternative CTGD on page 4-24.

II.BB. Comment

Groundwater Alternative SR should include a shallow well upgradient of the lagoons in the monitoring program (See Figure 4-9 of FS).

II.BB. Response

The comment to include a shallow well upgradient of the lagoons in the monitoring program for groundwater Alternative SR is recognized. It is assumed that a well in the location is desired to establish background conditions in the shallow aquifer during the monitoring program, since an explanation is not provided in the comment. Long-term groundwater monitoring programs for each groundwater alternative (SR, CTGD, and CTP) will include a suitable existing upgradient monitoring well, or a new shallow upgradient well will be installed for this purpose.

II.CC. Comment

Figure C-4 and page C-3-4 should clarify that the pictured drinking water receptor is not a well that exists now, but rather a possible future well.

II.CC. Response

At the time of the FS, information regarding well screen depths was not available for all area drinking water wells. The Genesee County Health Department provided well screen depth information for some area wells for use during the RI (See figure 3-6, Forest Waste RI). Figure 3-4 and Page C-3-4 identify the nearest resident whose well, if screened in the upper sand and gravel aquifer, could be in the path of a migrating contaminant plume.

II.DD. Comment

Comments on modelling in Appendix C:

1. The input values for modelling reflected in Tables C-6 and C-7 should be provided, as well as the source of that input data.

2. The parameter pH needs to be modelled in Appendix C to determine its value as contaminated groundwater discharges to the nearest surface water body.

II.DD. Response

The twelve wells used to establish maximum and mean input values for the no action alternative groundwater modelling are shown in Figure C-5, as described on page C-3-4 of the FS. The maximum and calculated mean values from these wells for each constituent are presented in the second column of Tables C-6 and C-7, respectively.

The groundwater modelling presented in Appendix C-3 estimates the concentration of groundwater constituents at the nearest surface water discharge point (wetlands east of the site) using the set of input concentrations from 12 wells assumed to be in the migrating plume. The model is based on simple deletion of unreactive constituents in water and assumes one dimensional flow and complete mix conditions at the point of discharge. Use of this model to estimate pH in the discharge would be impossible from a practical standpoint due to the highly reactive nature of the hydrogen ion in the presence of other cations and anions in the groundwater and in the soil through which it migrates.

Maximum and mean pH values that correspond to the input data used in the modelling are 10.6 and 7.8, respectively. The mean value is well within the acceptable pH range for the protection of aquatic life, 6.5 - 9.0 (Ambient Water Quality Criteria Goldbook, based on Quality Criteria for Water Redbook, 1976). The maximum value was measured in MW84-2, approximately 700 feet from the wetland. Groundwater pH is expected to be lowered into the neutral range as at migrates and is buffered through reactions with natural soil constituents. Monitoring groundwater for the changes in pH is a component of the selected remedy.

Groundwater pH from the four offsite wells (MW86-2, 86-3, 86-4 and 86-5) was also measured during the sampling efforts and their pH values are 7.4, 7.2, 7.6, and 8.2 respectively. These values are all within the neutral pH range discussed above.

The selected groundwater remedy provides for monitoring the groundwater at the offsite and onsite location to detect changes in the chemical concentrations as well as pH. If significant changes in the quality of the water are found through monitoring remediation reevaluated.

II.EE. Comment

Permits Issues

1. If an alternative is chosen which would involve discharge to Butternut Creek, an Inland Lake and Streams Permit (1972 PA 346, as amended) will be necessary for construction activity below the ordinary high water mark of the watercourse.

2. Any alterations or occupation of the floodplain of Butternut Creek requires review and permitting under the Floodplain Regulatory Authority (1929 PA 245, as amended by PA 347, as amended) from the local soil erosion

control office. A permit for any earth changes within 500 feet of a waterbody one acre in size or larger will be necessary for several of the alternatives discussed in the FS.

3. A permit under the Soil Erosion and Sedimentation Control Act (1972 PA 347, as amended) from the local soil erosion control office for any earth changes within 500 feet of a waterbody of one acre in size or larger will be necessary for several of the alternatives discussed in the FS.

II.EE. Response

Section 121 (e) of CERCLA states that no Federal, State or local permit is required for the portion of a Superfund remedial action (RA) conducted entirely onsite. U.S. EPA will, however, assure that all substantive technical requirements of a permit will be met for onsite actions. The exemption for a permit does not extend to portions of an RA conducted offsite.

If the selected remedy included a discharge to Butternut Creek, or alterations or occupation of the floodplain of Butternut Creek, the above cited permit(s) (1 and 2) would be obtained. If future groundwater remedial action or treatment for the landfill dewatering system will require such activities near Butternut Creek, appropriate permit(s) will be obtained.

The selected landfill Alternative SRCVT will require earth changes of one acre or larger in size. Such earth changes will be conducted onsite and only the substantive technical requirements of the permit in the Soil Erosion and Sedimentation Control Act, will be followed. Similarly, other alternatives in the FS with earth changes greater than one acre would be conducted entirely onsite, and only the substantive technical requirements of the permit would be followed. No other alternative is, however, selected for implementation.

II.FF. Comment

POTW Issues

The proposed discharge of purged groundwater to the City of Flint POTW would be regulated under their Industrial Pretreatment Program. The City of Flint (POTW) superintendent should be contacted early in the planning stages for any proposed discharge to their treatment facility.

1. The POTW presently incinerates sludge but is considering a land application program. The effects of the site groundwater on that program should be evaluated.

2. The treatment facility has a primary treatment retention basin that discharges periodically during wet weather. This must be taken into account for any proposed trucking of groundwater to the POTW.

II.FF. Response

These implementability issues regarding the use of a POTW are recognized. Alternative CTP is not, however, the selected groundwater alternative. If use of a POTW is anticipated for treatment of water from the landfill dewatering system, the suggested coordination will be followed.

II.GG. Comment

The lagoon liquids and solids should be removed now. After that is done, U.S. EPA will need to study the site again to determine what to do on the rest of the site.

II.GG. Response

The lagoon liquids and solids are scheduled for removal this construction season as the earlier selected (June 30, 1986) lagoon operable unit remedy. The remaining operable units of concern at the site, the landfill and contaminated groundwater to the east, have been carefully studied as summarized in the RI report. Removal of the lagoon liquids and solids will have no effect on the condition of the site landfill. Selection of Alternative SRCVT for the landfill based on current information, therefore, is appropriate. The lagoon cleanup will prevent any further contribution to the groundwater contamination on the east end of the site, but will have no effect on the current degree of that groundwater contamination. U.S. EPA was fully aware of the effects of the removal of the source of groundwater contamination when it selected groundwater Alternative SR. Selection of the groundwater alternative at this time, therefore, is also appropriate.

II.HH. Comment

A fence should be put around monitoring well OW-3S. This well is contaminated and, when it is sampled, contaminated groundwater is brought up to the surface and people can come in contact with it. People may get sick. A fence around the Borges property is also needed since the wetlands on this property is contaminated.

II.HH. Response

The fence surrounding the Forest Waste site was constructed to discourage trespassers from entering the site and coming into direct contact with hazardous substances on the surface of the site (lagoon wastes, landfill surface soil and waste). Direct contact with these substances present an unacceptable public health threat. The area surrounding monitoring well OW-3S and the wetlands to the east do not present this unacceptable public health threat, therefore, do not need to be fenced. When well OW-3S is sampled the water will be collected and brought onsite for proper discharge.

II.II. Comment

The cost difference between Alternatives SRCV and SRCVT is $13 million. The cost difference between Alternatives SRCVT and RDN is $7 million. The cost difference between Alternatives RDN and RDF is $30 million. If there is a goal for cost effectiveness, these comparisons should be evaluated.

II.II. Response

U.S. EPA recognizes the relative cost differences between the three alternatives. Selection of a cost effective remedy, however, depends on more than just absolute differences in cost. It is also depends on evaluation of costs as they relate to relative effectiveness of alternatives. Remedy selection furthermore, is based on an evaluation of the effectiveness, implementability, and cost considerations. As documented in the ROD, Alternative SRCVT is a cost effective remedy which best balances the nine evaluation criteria.

II.JJ. Comment

U.S. EPA and MDNR should immediately negotiate and reach a common understanding as to what remedy should be implemented at the site. The results should be reported to the community.

The government officials involved in this project should work together. The government officials are not honest, cooperative, or reasonable.

II.JJ. Response

U.S. EPA has been working closely with MDNR to resolve the issues associated with the landfill and groundwater remedy selections. U.S. EPA has included an official response to the State's concerns in this Responsiveness Summary. Many of the State's concerns have been acknowledged, and a commitment to address those concerns has been made.

U.S. EPA stands ready to address numerous State concerns with landfill Alternative SRCVT, and is ready to fully fund the design and fund 90% of the remedial action costs for this remedy. U.S. EPA is also ready to negotiate with the State for a more expensive alternative than SRCVT wherein U.S. EPA will contribute 90% of the costs of the components of that remedy which are similar to Alternative SRCVT, and the State will pay the full costs of additional measures the State desires. Even under that cost share scenario, the State is very likely to contribute far less money to the landfill cleanup than U.S. EPA.

The differences in the groundwater alternatives supported by each of the Agencies are somewhat more difficult to resolve. U.S. EPA is however, continuing discussions with the State. Some fundamental differences between U.S. EPA and MDNR on the Forest Waste site remedy selection do exist, due to some fundamental differences in the Agencies' approaches to waste management. All individuals involved in the project are, however, working hard with the utmost cooperation and reasonableness to try to reach a resolution.

U.S. EPA assures that their communications with the State, the public, and all others involved in the Forest Waste project have been fully honest.

II.KK. Comment

Michigan State Congressional Representative Nate Yonkers wants to know what needs to be done to get the Forest Waste Project moving more quickly than it has in the past.

A community resident suggested U.S. EPA seek help for speeding up site cleanup from Nate Yonkers.

II.KK. Response

U.S. EPA recognizes the concerns of the local citizens and Representative Yonkers in gaining expeditious cleanup of the Forest Waste Site. U.S. EPA shares that concern.

It must be kept in mind that the Superfund program is dealing with a nation-wide problem of hazardous waste which has been created over decades of time. Over 900 sites have been identified on the Superfund National Priorities List (NPL) as priority sites for remedial cleanup action in the U.S. Many of those sites have not even initiated the study phase (RI) which began at Forest Waste in 1984. Forest Waste, in fact, has received early attention for action under the Superfund Program. The early fencing action helps discourage trespassers and helps prevent human contact with wastes on the site surface. The lagoon cleanup, currently in design phase, will provide a major remedial cleanup at the site. Currently the site presents no public health or environmental risks to the surrounding community if individuals do not enter the site.

Forest Waste will continue to receive priority action for cleanup. We are not, however, optimistic that the pace of progress will quicken and have no suggestions for help from Representative Yonkers that would quicken that pace for Forest Waste cleanups within the Superfund program. Site cleanup action is currently progressing as fast as possible within the constraints of the program.

II.LL. Comment

Residential Well Issues

1. All residential drinking water wells should be tested more than once a year.

2. All residential drinking water wells less than 100 feet in depth, should be replaced by U.S. EPA. U.S. EPA has spent a lot of money on monitoring wells. It is the community's money.

II.LL. Response

It is clear from the Forest Waste RI/FS that contaminants from the site have not reached, and will not reach, surrounding residential wells any time in the near future. A thorough groundwater monitoring scheme is, furthermore, part of the Forest Waste selected remedy to assure that surrounding wells will remain unaffected by site contaminants. The selected remedies for the site provide protection to residential wells from the current and future releases of site contaminants. Therefore, at this time, U.S. EPA does not believe there is any need to or justification for replacing residential drinking water wells.

Visiting of residential wells can be done by the Genessee County Health Department. The commenter's concern about sampling has been forwarded to them.

II.MM. Comment

Farrand Road should be paved at the expense of PRPs. Spills may happen when site cleanup is underway and it will be difficult to clean up on a gravel road.

II.MM. Response

Responsible parties under the Superfund law are not responsible for the road conditions near Superfund NPL sites. If during necessary offsite transport of hazardous wastes from the Forest Waste site, spills occur on Farrand Road, proper cleanup of the spill will be done by the transporter. Although spills may be difficult to clean up on a gravel road such as Farrand, they can be done properly. Hazardous waste transporters, futhermore, are required by regulation to take precautions to reduce the likelihood of spills.

II.NN. Comment

Approximately eight families around the site should be relocated. It would cost less money than cleaning up the site.

II.NN. Response

A buy out and relocation of the approximately eight families around the site without any other action would provide minimal long-term protection to public health and the environment from the Forest Waste Site. This action would provide no active waste management, and would do practically nothing towards meeting the site remedial action goals stated on page 2-3 and 2-4 of the U.S. EPA FS. This action would not be cost effective or protective and is not acceptable for selection.

II.OO. Comment

Contaminated water is migrating onto the Borges property to the east, into the pond on the property, then into Butternut Creek, then into Mott Lake, then into Lake Huron. At least three more wells on the northeast side of the Borges property are needed.

II.OO. Response

The extent of contamination in the shallow aquifer has been adequately identified through the groundwater sampling efforts performed during the RI. Evaluation of the site hydrogeology indicates that the shallow groundwater migrates and discharges to the wetlands east of the site. However, surface water drainage patterns indicate that these wetlands are also fed by wetlands and drainage areas that are north and northeast of the site. Sampling and analysis of surface water east of the site did not reveal any patterns of contamination.

Chemical constituent concentrations in fourteen monitoring wells (twelve are east and southeast of the lagoons) will continue to be monitored in the selected remedy. U.S. EPA believes this number is adequate to provide information regarding changes in groundwater quality as the plume migrates offsite to the east.

II.PP. Comment

Taxes should not be charged on the Borges property.

II.PP. Response

Issues concerning local property taxes should discussed with the local taxing body. U.S. EPA has no authority regarding property taxes.

II.QQ. Comment

Tracking devices such as radioactive or colored dyes should be used to track groundwater flow.

II.QQ. Response

Introducing radioactive agents into a drinking water aquifer would present unnecessary risk to human health and the environment. Tracking groundwater flow with dye requires long-term (in excess of 15 years) data collection which would delay the implementation of a remedy at the site. The site hydrogeology has been adequately characterized from RI data.

II.RR. Comment

During cleanup will residents be relocated? If so, how long will it be?

118

Will residents be compensated for the inconvenience? Who will guard property during relocation?

II.RR. Response

Relocation of residents is not anticipated during Forest Waste remedy implementation. If it is needed, these issues will be discussed and resolved.

II.SS. Comment

This contamination is a very grave problem.

II.SS. Response

U.S. EPA recognizes the risk from the Forest Waste site (Chapter 6 of the RI) and has selected landfill Alternative SRCVT and groundwater Alternative SR to effectively manage these risks.

II.TT. Comment and Response

A letter dated January 21, 1988, from Gary E. Guenther, Chief, Environmental Response Division, MDNR to Basil G. Constantelos, Chief, Waste Management Division, U.S. EPA, was submitted during Public Comment Period. The March 1, 1988, letter from Mr. Constantelos responding to the January 21, 1988, correspondence from Mr. Guenther will serve as a response to this comment.

III. Comments from the U.S. Department of the Interior - Fish and Wildlife Services (FWS)

The FWS concurs with the U.S. EPA recommended landfill Alternative SRCVT, and with the recommended groundwater Alternative SR.

III. A. Comment

U.S. EPA should assure appropriate measures will be taken to protect biotic resources of surface waters if the groundwater Alterative SR monitoring shows contaminated water is discharging to surface water bodies.

III. A. Response

U.S. EPA recognizes the support of the FWS.

Groundwater Alternative SR is configured such that if unanticipated offsite migration of contaminants is detected, which would exceed Ambient Water Quality Criteria if released to the wetlands east of the site, a plan for groundwater remedial action will be evaluated.

III. B. Comment

The Endangered Species Act of 1973, as amended, requires that federal agencies obtain from FWS information concerning any species, listed, or proposed to be listed, which may be present in the area of a proposed action. The FWS checked their files and there are no species present in the project area that are federally listed, or proposed to be federally listed, as endangered or threatened.

III. B. Response

U.S. EPA recognizes the above information provided by the FWS.

ADMINISTRATIVE RECORD

GUIDANCE DOCUMENTS USED

Title	Author	Date
Letter to Honorable J. Florio	Lee Thomas	5/21/87
Interim Guidance on Compliance with Applicable or Relevant and Appropriate Requirements	J.W. Porter	7/9/87
Hazardous Waste Management System Land Disposal Restrictions Final Rule 40 CFR Part 260 et seq.	U.S. EPA	11/7/87
Ambient Water Quality Criteria for Polynuclear Aromatic Hydrocarbons. Office of Water Regulations and Standards, Criteria and Standards Division. EPA 440/5-80-069	U.S. EPA	Oct. 1980
Federal Register Part V, National Oil and Hazardous Substances Contingency Plan	U.S. EPA	July 16, 1983
National Priorities List. 876 Current and Proposed Sites In Order of Ranking and By State	U.S. EPA	Oct. 1984
Guidance on Feasibility Studies Hazardous Waste Engineering Research Laboratory, Cincinnati, Ohio	U.S. EPA	April 1985
Memorandum: RCRA Region V Policy on Groundwater Restoration at Solid Waste Management Units	B. Constantelos	June 16, 1987
Record of Decision: Spiegelberg Landfill, Livingston County, Michigan	U.S. EPA	Sept. 1986
Record of Decision: Metamora Landfill, Metamora, Michigan	U.S. EPA	Sept. 1986
Resource Conservation and Recovery Act 40 CFR Part 260 et seq.	U.S. EPA	
Chemical, Physical and Biological Properties of Compounds Present	U.S. EPA	9/85

121

Title	Author	Date
Endangerment Assessment Handbook at Hazardous Waste Sites	U.S. EPA	8/85
Guidance on S/F Selection of Remedy	J.W. Porter	12/24/86
Additional Interim Guidance for '87 RODs	J.W. Porter	7/24/87
Guidance on Feasibility Studies Under CERCLA	U.S. EPA	4/85
Comprehensive Environmental Response, Compensation and Liability Act	Executive Order 12316	1980
Community Relations Guidance for Evaluating Citizens Concerns at Superfund Sites	U.S. EPA (OSWER 9230.0-04)	10/17/83
CERCLA Compliance with Other Environmental Statutes	U.S. EPA (OSWER 9234.0-02)	10/2/85
User's Guide to the Contract Laboratory Program	U.S. EPA (OSWER 9240.0-01)	10/1/84
Delegation of Remedy Selection to Regions (Under Delegation #14-5)	U.S. EPA (OSWER 9260.1-09)	3/21/86
Superfund Public Health Evaluation Manual	U.S. EPA (OSWER 9285.4-01)	11/7/86
Procedures for Planning and Implementing Off-site Response Actions	U.S. EPA (OSWER 9330.2-01)	5/6/85
Participation of Potentially Responsible Parties in Development of RIs and FSs	U.S. EPA (OSWER 9340.0-01)	3/20/84
Guidance on Feasibility Studies Under CERCLA	U.S. EPA (OSWER 9355.0-056)	6/1/85
Guidance on Remedial Investigations Under CERCLA	U.S. EPA (OSWER 9355.0-06B)	6/1/85
Remedial Action Costing Procedures Manual	U.S. EPA (OSWER 9355.0-10)	9/1/85

Title	Author	Date
Interim Guidance on Superfund Section of Remedy	U.S. EPA (OSWER 9355.0-79)	12/24/86
Remedial Action at Waste Disposal Sites Handbook (Revised)	U.S. EPA (OSWER 9380.0-04)	10/1/84
Procedures for Identifying Responsible Parties: Uncontrolled Hazardous Wastes - Superfund	U.S. EPA (OSWER 9834.3)	2/1/82
Policy on Enforcing Information Requests in Hazardous Waste Cases	U.S. EPA (OSWER 9834.4)	9/10/84
Participation of Potentially Responsible Parties in Development of Remedial Investigation and Feasibility Studies	U.S. EPA (OSWER 9835.1)	3/20/84
General Toxicology Handbook	U.S. EPA (OSWER 9850.2)	9/20/85
Discharge of Wastewater from CERCLA Sites into POTWs	U.S. EPA	4/15/86
Covers for Uncontrolled Hazardous waste Sites	U.S. EPA	9/1/85
Handbook for Stabilization/Solidification of Hazardous Waste	U.S. EPA	6/1/86
Administrative Records for Decisions on...CERCLA Response Actions	U.S. EPA	5/29/87
Mobile Treatment Technologies for Superfund Wastes	U.S. EPA	9/1/86
U.S. EPA Groundwater Protection Strategy	U.S. EPA	8/1984

Other guuidances used are cited within the Administrative Record documents.